UNDERLYING PROCESSES IN SOCIAL ANXIETY

By

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Chapter 1: Literature Review

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Thesis Overview

The overall aim of the thesis is to explore some theorised processes underlying social anxiety. Social anxiety is the experience of anxiety in response to social or performance situations, and is a common (Henderson, Gilbert & Zimbardo, 2014) and impairing (Wittchen & Jacobi, 2005) experience, with high comorbidity with other anxiety and mood problems (Kessler, Avenivoli, et al., 2012; Kessler, Petukhova, et al., 2012) and some indication that it can lead to decreasing functioning and increasing distress over time (Beesdo et al., 2007). More than half the population report some degree of shyness or social worry (Henderson, Gilbert & Zimbardo, 2014), and understanding what underlying functions may perseverate to impair functioning may aid understanding, prevention and earlier intervention to reduce distress and increase functioning.

The first chapter of this thesis is a systematic review. Several forms of attachment were included and combined with measures of social anxiety in both clinical and non-clinical populations to explore the nature of this relationship, both directly and through mediation/moderation by other variables. Thirty studies were identified and findings were synthesised narratively, meta-analysis being inappropriate due to variance between studies. Attachment was explored due to theoretical assertions that processes underlying social anxiety develop in attachment relationships (Vertue, 2003). Evolutionary psychological models of social anxiety also indicate a role for shame and social comparison as an overactive social rank system in social anxiety (Gilbert, 2000; 2001), and this was explored as a potential mediator of the relationship between attachment and social anxiety.

The second chapter is an empirical study. Continuing the thesis from chapter one, the aims of the empirical study were to a) replicate findings that attachment would be associated with social anxiety, but when controlling for particular cognitive and evolutionary

behavioural variables this association would lose significance and b) extend these findings through comparison of anxiety, shame and social comparison in the moment using experience-sampling methodology (ESM). As social anxiety is conceptualised as a continuum of severity and distress (Ruscio, 2010) this comparison was made within-subjects. It was hoped that observing variables in the moment would illuminate processes underlying social anxiety in different contextual settings and elucidate differences between social and non-social environments. Ultimately it was hoped that better understanding of variance in shame and social comparison in the moment could guide identification and prevention of pre-clinical experiences, as well as guide more targeted intervention based on understanding of underlying processes. Overall consideration of attachment as one potential root for these underlying processes could also be considered based on extant research.

Appendices were limited by the accepted word count for this thesis, but include author guidance for the formatting of both chapters one and two, which are written to comply with the requirements of the Journal of Affective Disorders. The quality assessment tool used in chapter one is also included, as are methodological points used for chapter two. These include the person-level and ESM questionnaires, as well as the participant information sheet and advert.

Following completion of this thesis, it is intended that findings from both studies will be disseminated to academic audiences through publication in peer-reviewed journals, as well as lay descriptive leaflets being emailed to participants who cited their interest in hearing results of the study.

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Chapter 1: Systematic Literature Review

Title: If I'm bad and/or you're bad, why would we socialise? A systematic review of adult attachment and social anxiety.

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Note: Literature Review prepared for submission to the Journal of Affective Disorders – word limit: 8000 excluding tables, figures and references (author instructions can be found in Appendix A)

Abstract

Background: Social anxiety is the second most common anxious condition, though developmental processes are not fully understood. Attachment has been suggested as one potential factor underlying the development of social anxiety. This systematic review aims to integrate a recent spate of research exploring adult attachment and social anxiety with historical findings to explore this relationship and guide future research and practice.

Method: A systematic literature review and narrative synthesis incorporated an electronic search of MEDLINE, PsychINFO and Web of Science until January 2016 reviewed by two independent researchers. Included studies' bibliographies were reviewed and methodological quality was assessed.

Results: Twenty-seven articles describing 30 studies met inclusion criteria. Almost all studies found an association between attachment and social anxiety. In particular attachment anxiety was associated with social anxiety. Cognitive variables and evolutionary behaviours were identified as potential mediators between attachment and social anxiety, concordant with psychological theory.

Limitations: The included studies were limited to English language, and excluded late adolescent studies that may have affected overall results. Due to limited longitudinal studies, causality between attachment and social anxiety variables could not be inferred. Additionally, results were subject to a narrative synthesis only, which limited the ability to report an overall effect-size to better understand this relationship.

Conclusions: Literature indicates attachment my play an important role in social anxiety, and should be considered when working clinically with this population. It also suggests that underlying processes that mediate this relationship as important targets for intervention or possible prevention in social anxiety.

Keywords: Attachment, social anxiety, systematic review, narrative synthesis, mediation, adult

Highlights

- *Adult attachment is associated with social anxiety.*
- *Cognitive and behavioural variables mediate adult attachment and social anxiety.*
- *Insufficient evidence exists to infer causality in these relationships.*
- *Attachment is a varied construct measured using diverse techniques.*

Introduction

Social anxiety is the fear of or anxiety in response to social interactions and/or performance situations that is out of proportion to the actual threat of this experience (NICE, 2013). It is reported as the second most common anxious condition with a lifetime prevalence of 6.7% - 10.7% in western countries (Fehm, et al., 2005; Kessler, Petukhova, et al., 2012). When considered on a continuum, less pervasive/distressing social anxiety, in the form of shyness or behavioural inhibition, may extend to more than half of the population during adolescence/early adulthood (Aderka, et al., 2012; Henderson, et al., 2014). At greater severities, social anxiety has high comorbidity with other psychosocial problems, such as depression (Beesdo et al., 2007) and other anxiety conditions (Kessler, Avenivoli, et al., 2012). It is also associated with impairments to quality of life (Wittchen & Jacobi, 2005), romantic relationships (Sparrevohn & Rapee, 2009) and friendships (Davila & Beck, 2002). Numerous therapeutic approaches to treating social anxiety have now been evidenced (Mayo-Wilson et al., 2014). Though treatment effect sizes are impressive for pharmacological (SSRI/SNRI standardised mean difference −.91, −1.23 to −.60) and psychological treatment (CBT −1.19, −1.56 to −.81; Mayo-Wilson et al., 2014), a proportion of participants (24% - 34%) fail to respond to treatment in randomised controlled trials (Clarke et al., 2006; Stangier et al., 2011), even when participants with comorbid diagnoses that can complicate the clinical picture were often excluded from studies (Mayo-Wilson et al., 2014). Understanding underlying psychological mechanisms associated with the development and maintenance of social anxiety might provide an opportunity for earlier intervention/prevention and potentially more effective treatments. A greater understanding of underlying mechanisms may also illuminate why treatment may or may not be effective or endure. This review focuses on one potential mechanism, attachment.

Attachment theory posits that humans are motivated to form affective bonds with others when vying for safety, comfort and protection (Bowlby, 1988). We form 'internal working models' (IWMs) from interaction experiences, which generate implicit rules for understanding ourselves, others and how the two interact. Primary caring relationships are considered central to the development of IWMs (Bowlby, 1988), but peer and romantic relationships are also potentially important (Hazan & Shaver, 1987; Pierce & Lydon, 2001; Davila & Sargent, 2003; Fraley, et al., 2013). Sensitive and attuned interactions with caregivers and important others, particularly in response to distress, can result in secure attachment, and IWMs of self as loveable and able, and others as caring and reliable. Neglectful or abusive interactions with others can result in insecure attachments and IWMs of self as worthless and inept, and/or others as abusive and untrustworthy (Bretherton & Munholland, 1999). Attachment style throughout life can be characterised by IWMs about self and others, guiding individual behaviour based on the extent to which a person seeks or avoids attachment experiences (Brennan, et al., 1998).

In addition to separating attachment into 'secure' and 'insecure', the literature initially explained attachment according to secure, anxious-ambivalent and avoidance attachment styles (Ainsworth et al., 1978; Hazan & Shaver, 1987). Based on this development, dimensional models of attachment anxiety/avoidance and IWMs of self and other were developed to capture variance within the different styles (Bartholomew, 1990; Ravitz, et al., 2010). These models overlap with negative IWMs of self (i.e. seeing self as unlovable) analogous to high attachment anxiety and prediction of rejection by others as a result of these beliefs. Negative IWMs of others (i.e. seeing others as untrustworthy) are analogous to high attachment avoidance as a result of negative beliefs about others (Ravitz, et al., 2010). Dimensional models then correspond to attachment 'prototypes' of secure, preoccupied, dismissive or fearful attachment styles (Bartholomew, 1990). Positive IWMs of self and

others corresponds to low attachment anxiety and avoidance, and a secure attachment style. Past research describes the desire for attachment as fundamental to human experience (Baumeister & Leary, 1995). Negative/undesirable IWMs predicting rejection from others may understandably result in anxiety in social situations, despite still feeling a drive for attachment. Thus, attachment may play a key role in the development of social anxiety.

Vertue (2003) posits a unifying theory linking evolutionary, self-presentation and learning theories of social anxiety through the lens of attachment to explain the origins, development and maintenance of social anxiety. Vertue's thesis is that early life experiences can result in IWMs of self as inferior, undesirable, low in social-status (Ollendick & Benoit, 2012; Brumariu, et al., 2013), and models of others as predicting rejection or abandonment. These activate evolutionary behaviours of submission to and avoidance of others, which induce and reinforce anxiety in social domains (Weisman, et al., 2011). This in turn could influence adult attachment security reinforcing avoidance and overestimation of social risks (Fraley et al., 2013). Conceptually, this theory compliments cognitive models of social anxiety (i.e. Clark & Wells, 1995), wherein underlying schemata of self and others result in appraisals of social situations as threatening, leading to self-monitoring and avoidant safety behaviours.

Child/adolescent samples have demonstrated the importance of attachment alongside parenting style, social competence and behavioural inhibition in the development of social anxiety (i.e. Cunha, et al., 2008; Brumariu & Kerns, 2008; 2010). Early adulthood has been associated with a spike in anxious symptomology, which may be related to significant social and environmental change during this period (Copeland, et al., 2014). Understanding how attachment may influence the development and maintenance of social anxiety in adulthood could lead to more effective assessment and intervention, alleviating suffering and minimising the potential development of comorbid problems (Stein et al., 2001; Beesdo et al.,

2007). This literature review aims to evaluate the evidence in the extant literature of an association between adult attachment and social anxiety symptoms.

Method

The protocol is available on the PROSPERO data repository website: http://www.crd.york.ac.uk/PROSPERO registration number: CRD42016032991.

Study Eligibility

Eligible studies included: i) an adult sample, with a mean age of 18 years or older ii) a quantitative self-report or interview measure of attachment and social anxiety, studies using clinical diagnoses of social anxiety disorder will also be included iii) analysis of the relationship between attachment and social anxiety iv) a cross-sectional, intervention, or longitudinal study design, and v) were published in English language journal. We included studies where attachment was measured prior to adulthood. Qualitative studies, reviews, editorials and case studies/case series were excluded as the main focus of this review was on quantitative research. Studies explicitly considering social anxiety as related to autistic spectrum conditions were also excluded from this review.

Search strategy

Electronic searches of MEDLINE, psycINFO and ISI Web of Science databases (from date of inception until January 2016) were conducted using the following search terms, combined with Boolean operators: Attach* AND (“Soc* Anx*” OR “Soc* Phob*” OR “SAD”).

Initially titles and abstracts of all identified articles were screened for their appropriateness to the review question independently by two reviewers (RM, AC). Full texts

of articles appearing potentially relevant were then reviewed against inclusion criteria by two independent reviewers (RM, AC), with disagreements arbitrated by a third reviewer (PT). Reference lists and citing articles of selected studies were also checked for appropriate studies. Corresponding authors of included articles were contacted regarding any additional published or unpublished papers that might fit the inclusion criteria (Appendix B). Additionally, two experts in the field of attachment and two experts in the field of social anxiety were contacted about any papers or unpublished manuscripts omitted from the list of included studies. Any conference abstracts identified during the course of online searches were followed up by contacting authors and inquiring about any related publications or unpublished papers that may be eligible for inclusion in the review.

Risk of Bias

Included studies were assessed using a methodological quality assessment tool for observational research, adapted from one used by the Agency for Healthcare Research and Quality (AHRQ; Williams, et al., 2010; Appendix C). Two reviewers (RM and AC) independently rated risk of bias and methodological quality, with the supervising author (PT) acting as arbitrator. Methodological quality assessment is reported descriptively.

Results

The outcome of the literature search and screening is reported in Figure 1.Ultimately, 27 articles met criteria for inclusion in the review, describing *k* = 30 studies.

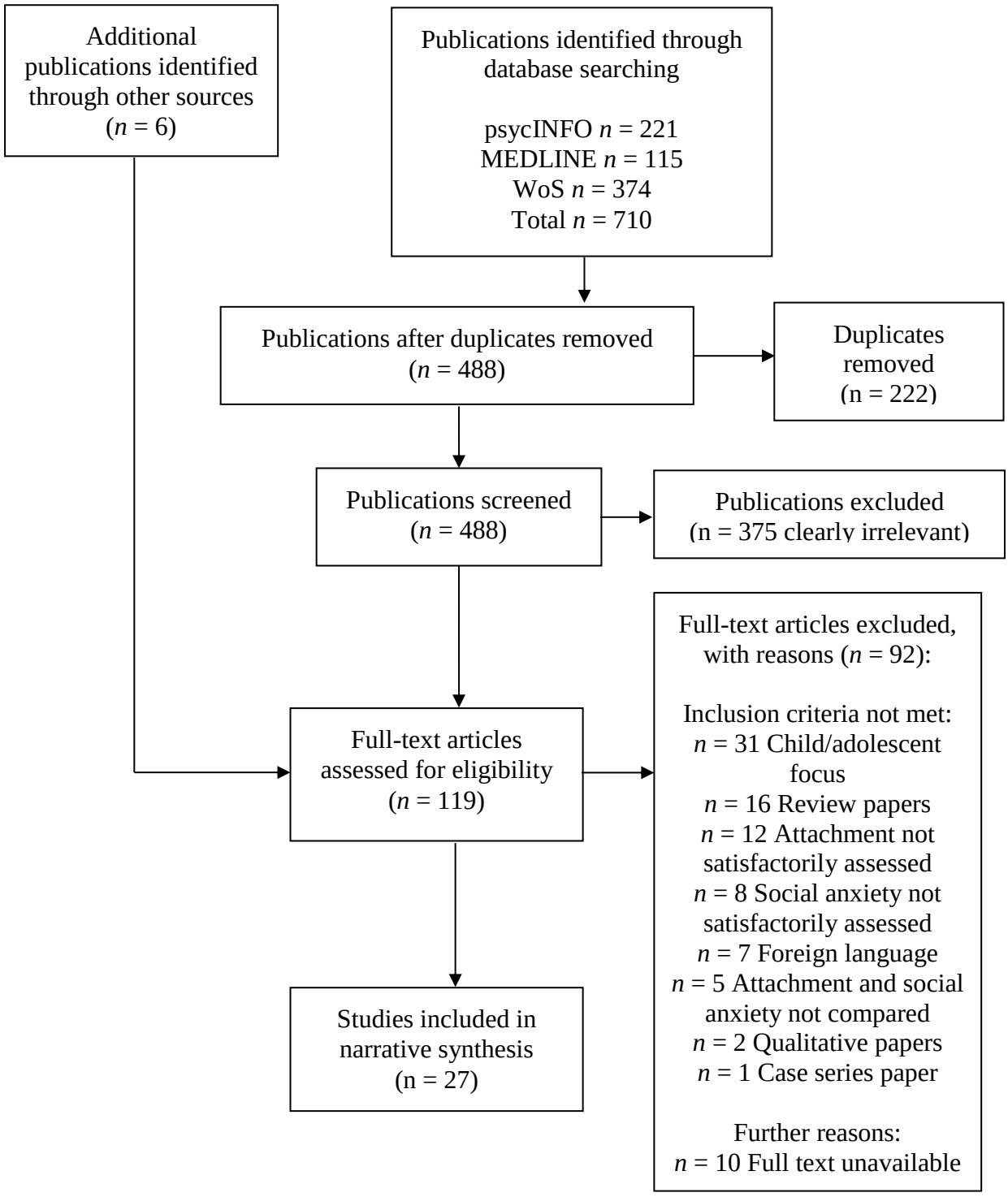

Figure 1. Literature Review search flow diagram.

Due to variance in assessment and definition of attachment and social anxiety, meta-analysis was deemed inappropriate and results are synthesised narratively. Studies were grouped into four (not mutually-exclusive) categories. These included: Studies that compared social anxiety between attachment groups or attachment between social anxiety and control (k = 13); studies that examined within group associations (k = 23); studies that produced a moderation or mediational model of the relationship between attachment and social anxiety (k = 10); and longitudinal studies (k = 3).

Study Characteristics

Attachment and social anxiety were rarely the primary focus of included papers and only sample sizes, measures, data and outcomes relevant to this review are reported. Table 1 summarises the characteristics of the studies included in this review. Sample sizes ranged from n = 51 to n = 8080. Most studies took place in the USA, with others occurring in western (UK, Sweden, Switzerland, Netherlands, Italy, Germany, Canada) and middle-eastern (Turkey, Israel) countries, with one study in China. Different forms of the Experiences in Close Relationships scale (Brennan, et al., 1998) were the most common means of assessing attachment (used in k = 13 studies). In total 13 measures of attachment were used, including one behavioural measure (Strange situation, Ainsworth et al., 1978) and one interview measure (Attachment Style Interview, ASI; Bifulco et al., 1998). Measures of social anxiety also varied with the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) used in k = 10 studies and the Social Interaction Anxiety Inventory (SIAS; Mattick & Clarke, 1998) used in k = 9 studies. In total, 15 measures of social anxiety were used, including two interview measures collectively used in k = 5 studies.

Of the different conceptualisations of attachment, k = 14 studies used a dimensional model of attachment anxiety and attachment avoidance (Brennan, et al., 1998).

Bartholomew's (1990) categorical model of secure, preoccupied, fearful and dismissive attachment was the theoretical basis for $k = 9$ studies. Models of attachment conceptualising secure, anxious-ambivalent and avoidant styles (Ainsworth et al., 1978; Hazan & Shaver, 1987; Collins, 1996) were the basis for $k = 3$. Two studies conceptualised attachment on a single continuum from insecure to secure attachment. Bifulco and colleagues (2006) used an interview assessment of attachment, and conceptualised 'Secure, Enmeshed, Fearful, Angry-dismissive, Withdrawn' attachment styles.

Table 1
Characteristics of included studies

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Aderka et al. (2009), Israel	Cross-sectional	Community snowball recruitment	n = 102 (72 female); Age M = 29.5 (SD = 9.0); ethnicity not stated	-	ECR	LSAS
Anhalt & Morris (2008), USA	Cross-sectional	Students	n = 434 (282 female); Age M = 19.10 (SD = 1.05); Ethnicity: 92% caucasian; 4% African-American; 2% Asian-American; 1% Hispanic; 2% other	-	PBI; IPPA	SPAI
Bifulco et al. (2006), UK	Longitudinal	Community	n = 154 (154 female); Age range 26-59; ethnicity not stated	-	ASI	SCID
Boelen, et al. (2014), The Netherlands	Cross-sectional	Students	n = 215 (198 female); Age M = 21.6 (SD = 2.0); ethnicity not stated	-	ECR-R	SPIN
Bohlin & Hagekull (2009), Sweden	Longitudinal	cohort born in during 11 week period, 1985	n = 85 (Gender not stated); Age M = 21 and 3 months (SD = 3 months); ethnicity not stated	-	Stange situation (Ainsworth et al., 1978) at 15 months	SIAS & SPS

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Dağ, & Gülüm (2013), Turkey	Cross-sectional	Students	n = 992 (661 female); Age M = 21.07 (SD = 2.22); ethnicity not stated	-	ECR-R	LSAS
Dakanalis et al., (2014), Italy	Cross-sectional	Students at three universities in Italy	n = 359 (0 female); Age M = 20.4 (SD = 3.3); ethnicity not stated	-	Italian validated ASQ (Fossati et al., 2003)	Italian validated Interaction Anxiousness Scale (Conti, 1999)
Darcy, et al. (2005), USA	Cross-sectional	Students	n = 168 (88 female); Age M = 18.72 (SD = 1.05); Ethnicity: 73.5% Caucasian; 9% African American; 8% Asian Pacific Islander; 4% Latino/a; 6% other	-	RQ	SPAI

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Eng et al., (2001), USA	Controlled cross-sectional	population seeking anxiety treatment	Primary sample n = 118 (47 female); Age M = 32.73 (SD = 10.13); Ethnicity: 78.4% Caucasian, 12.9% African American, 8.6% other; Replication sample n = 56 (23 female); Age M = 33.39 (SD = 9.04); Ethnicity: 39.3% Caucasian, 25.0% African American, 35.7% other	n = 36 (17 female); Age M = 32.66 (SD = 10.68); Ethnicity: 61.1% Caucasian, 27.8% African American, 11.1% other	RAAS	LSAS-total fear scale; SIAS & SPS; FQ-social; BFNE; IPSM
Erozkan (2009), Turkey	Cross-sectional	Students	n = 600 (300 female); Age M = 21.80 (SD = 2.20); ethnicity not stated	-	RSQ	SAS
Fan & Chang (2015) (study 2), China	Cross-sectional	Students	n = 296 (95 female); Age M = 20.78 (SD = 1.73); Ethnicity: 100% Chinese	-	ECR-R	SIAS & SPS plus 10 new items specific to Chinese population (Fan & Chang, 2015)

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Forston (2005), USA	Cross-sectional	Students (Psychology undergratuates only	n = 503 (358 female); Age M = 19.9 (SD = 2.8); Ethnicity: 89.2% Caucasian; 4.2% African American; 1.6% Asian/Pacific Islander; 1% Hispanic; 3.6% Other	-	ASQ	SPAI
Gajwani, et al. (2013), UK	Cross-sectional	recruited from EIS	n = 51 (18 female); Age M = 19 (SD = 3.09); Ethnicity: 57%White British; 31%Asian; 4%Black/Black British Caribbean; 2% Black/Black British African; 6% other	-	RAAS	SIAS & SPS
Greenwood (2008), USA	Cross-sectional	Students	n = 241 (191 female); Age and ethnicity not stated	-	ECR	subscale from the MPPS-C
Gülüm & Dağ (2013) study 1, Turkey	Cross-sectional	Students	n = 992 (661 female); Age M = 21.07 (SD = 2.22)	-	ECR-R	LSAS
Gülüm & Dağ (2013) study 2, Turkey	Cross-sectional	Students	n = 875 (581 female); Age M = 21.1 (SD = 1.90)	-	ECR-R	LSAS

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Hoyer et al. (2016), Germany	Cross-sectional	Community Outpatients	n = 165 - 183 (91 - 101 female); Age M = 34.94 (SD = 12.11); Ethinicity not stated	-	ECR-R (German Version)	LSAS
Jordan (2010), USA/International (online recruitment)	Cross-sectional	users of online gamer forums	n = 141 (27 female); Age = 78%=18-24; 19.1%=25-35; 2.8%=36-45;0%=45+; Ethnicity: 75.9% Caucasian; 9.9% Latino/Hispanic; 7.1% Asian; 2.8% Biracial; 1.4% African American; 1.4% Native American; 1.4% other	-	RSQ	LSAS
Kashdan & Roberts, (2011), USA	Cross-sectional	Community Outpatients at a depression clinic	n = 76 (59 female); Age M = 37.8 (SD = 10.4); Ethnicity: 89.5% Caucasian; 10.5% Other	-	Adapted ECR to assess state attachment to therapists & group; good internal consistency	SCID & SIAS

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Lionberg (2003) study 1, Canada	Controlled cross-sectional	community anxiety clinic; control group from local community	n = 71 (36 female); Age M = 37.70 (SD = 12.33); ethnicity not stated	Panic disorder group n = 25 (80% female); Age not reported; Ethnicity not reported; Healthy control n = 46 (59% female); Age M = 37.30 (SD = 12.28);	RAAS	SCID
McDermott et al., (2015), USA	Cross-sectional	Students	n = 2644 (1216 female); Age M = 22.5 (SD = 5.26); Ethnicity: 67% white; 18% Asian/Asian American; 3.4% multi-racial; 3% African American/Blank; 2.5% Latino/a; 0.03% Pacific Islander	-	ECR-S	Social anxiety subscale of the CCAPS-62

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Michail & Birchwood (2014), UK	Controlled cross-sectional	Psychosis groups: service users of Birmingham EIS; SAD group: respondents from Social Anxiety UK; community sample from community	Group 1: n = 31 (20 female) social anxiety only; Age M = 27.6 (SD = 5.0); Ethnicity = 93.5% White British, 3.2% Asian, 3.2% Black British, 0% Afro-Caribbean, 0% Other; Group 2: n = 20 (13 female) first episode psychosis with social anxiety, Age M = 24.4 (SD = 5.1), Ethnicity = 35% White British, 40% Asian, 10% Black British, 10% Afro-Caribbean, 5% Other	Group 3: 60 (14 female) first episode of psychosis without social anxiety, Age M = 24 (SD = 4.5), ethnicity = 18.3% White British, 50% Asian, 16.6% Black British, 15% Afro-Caribbean, 0% Other; Group 4: n = 24 (13 female) healthy community, Age M = 24.2 (SD = 5.0), Ethinicity = 41.7% White British, 54.1% Asian, 0% Black British, 4.2% Afro-Caribbean, 0% Other	RAAS	SIAS & SPS

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Mickelson, et al. (1997), USA	Cross-sectional	Data from the national comorbidity survery (household survey of population between 15-54 in US)	n = 8080 (4083 female); Age: 15-24 range (n = 2000; 24.8% of sample) 25-34 range (n = 2435; 30.1% of sample) 35-44 range (n = 2189; 27.1% of sample) 45-54 range (n = 1456; 18.0% of sample); Ethnicity = 75.3% Caucasian; 11.5% Black; 9.7% Hispanic; 3.5% other	-	Attachment style measure drawn from Hazan & Shaver (1987)	CIDI
Nikitin & Freund (2010) study 1, Switzerland	Cross-sectional	Students and community of Zurich	n = 245 (181 female); Age M = 26.06 (SD = 5.95); ethnicity not stated	-	ASQ, german version (Hexel, 2004) abbreviated to 18 marker items	SIAS only
Parade, et al. (2010), USA	Longitudinal	Students	n = 172 (172 female); Age M = 18.09 (SD = 0.33); Ethnicity = 70% white; 18% Black; 5% Asian-American; 3% Hispanic-non-white; 4% other	-	IPPA	SIAS only

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Roring (2008), USA	Cross-sectional	Students	n = 194 (139 female); Age M = 19.41 (SD = 1.39); Ethnicity: 78.8% Caucasian; 3.6% African American; 3.1% Asian American; 2.6% Hispanic; 4.6% Native American; 6.2% Biracial; 0.5% multiracial; 0.5% Other	-	Adapted RQ for non-romantic attachment	SIAS & SPS
van Buren & Cooley (2002), USA	Cross-sectional	Students	n = 123 (Gender unclear); Age unclear; Ethnicity not stated. [1]	-	RQ	IAS
Weisman et al. (2011) study 1, Israel	Controlled cross-sectional	SAD treatment seekers & community controls	n = 42 (23 female); Age M = 30.5 (SD = 6.2); Ethnicity not stated	n = 47 (29 female); Age M = 29.5 (SD = 8.9); Ethnicity not stated	ECR	LSAS
Weisman et al. (2011) study 2, Israel	Controlled cross-sectional	SAD treatment seekers (with MDD) group & other ANX treatment seekers with MDD group	n = 45 (18 female) people diagnosed with SAD and MDD; Age M = 28.6 (SD = 5.7); Ethnicity not stated	n = 31 (16 female) people diagnosed with anxiety disorders other than SAD, plus MDD; Age M = 33.7 (SD = 11.2); ethnicity not stated	ECR	LSAS

Authors, year and country	Design	Sample source	Sample characteristics	control group characteristics	Attachment Measure	Social anxiety Measure
Weisman, et al., (2011) SEM, Israel	Controlled cross-sectional	SAD treatment seekers	n = 87 (41 female) people meeting SAD diagnostic criteria; Age M = 29.5 (SD = 6.0); Ethnicity not stated	-	ECR	LSAS

NOTE: [1] demographic information unclear as a subset of participants was used for attachment and social anxiety comparison; Attachment assessments: ASI = Attachment Style Interview (Bifulco, et al., 1998); ASQ = Attachment Style Questionnaire (Feeney, et al., 1994); ECR = Experiences in Close Relationships Scale (Brennan, et al., 1998); ECR-R = Experiences in Close Relationships Scale-Revised (Fraley, et al., 2000); ECR-S = Experiences in Close Relationships Scale – Short form (Wei, et al., 2007); IPPA = Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987); RAAS = Revised Adult Attachment Scale (Collins & Read, 1990; Collins, 1996); RQ = Relationship Questionnaire (Bartholomew & Horowitz, 1991); RSQ = Relationship Scales Questionnaire (Griffin & Bartholomew, 1994). Social anxiety assessments: BFNE = Brief Fear of Negative Evaluation scale (Leary, 1983a); FQ-social = Fear Questionnaire-Social subscale (Marks & Matthews, 1979); IAS = Interaction Anxiety Scale (Leary, 1983b); IPSM = Interpersonal Sensitivity Measure (Boyce & Parker, 1989); LSAS = Liebowitz Social Anxiety Scale (Liebowitz, 1987); MPPS-C = Measure of Public and Private Self-Consciousness (Fenigstein, et al., 1975); PBI = Parental Bonding Instrument (Parker, et al., 1979); SAS = Social Anxiety Scale (Özbay & Palanci, 2001); SIAS = Social Interaction Anxiety Scale (Mattick & Clarke, 1998; NOTE: companion measure with SPS); SPAI = Social Phobia Anxiety Inventory (Turner, et al., 1989); SPIn = Social Phobia Inventory (Connor, et al., 2000); SPS = Social Phobia Scale (Mattick & Clarke, 1998; NOTE: companion measure with SIAS). Other assessments: CCAPS-62 = Counselling Centre Assessment of Psychological Symptoms-62 (Locke et al., 2011); CIDI = Composite International Diagnostic Interview (World Health Organisation, 1990); SCID = Structured Clinical Interview for DSM-IV (First, et al., 1995).

Risk of Bias

The risk of bias assessment for each study is presented in Table 2. Common methodological problems included justification of sample size, lack of clarity/justification for recruitment population or strategy, and control or consideration of confounding variables in analyses. All but one study failed to justify their sample size using a power analysis and may have been underpowered, raising the probability of a type-II error. In some cases large sample sizes mean that power was unlikely to have been an issue (e.g. Mickelson, et al., 1997; McDermott et al., 2012). However, six studies included participant numbers below 90, and two of these also used structural equation modelling, a technique requiring larger samples (Weisman, et al., 2011 – $n = 87$; Gajwani, et al., 2013 – $n = 51$). Not having stated a power calculation for statistical analyses, these results must be interpreted with caution.

Several studies ($k = 15$) recruited participants exclusively from undergraduate university courses which increased the possibility of cohort effects (i.e. level of education, socio-economic status, ethnicity). Several studies ($k = 12$) failed to control for covariates associated with social anxiety and/or attachment. For example, depression was highly associated with social anxiety and attachment in the included literature ($k = 7$), though other studies failed to control for this association, meaning the relationship between social anxiety and attachment may be confounded by uncontrolled variables. Studies using unrepresentative samples that also failed to control for confounders may doubly impair the reliability of their findings.

Measures of attachment and social anxiety occasionally lacked rigour ($k = 9$), in some cases using older scales or subscales not intended for individual use. Most studies assessed attachment and social anxiety at one time point using self-report questionnaires, limiting researcher-related bias. However, studies using face-to-face measures ($k = 5$), or assessing at

sequential time points (k = 3), without discussing blinding of assessors researchers may have influenced responding or interpretation. Assessors may have been biased in their ratings based on their understanding of participants' attachment styles or social anxiety. Additionally, few papers (k = 8) stated whether the assumptions underlying their analyses were met. Consequently it is unclear whether their analyses are appropriate and results valid.

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Table 2
Risk of bias assessment

Authors	Unbiased selection of cohort	Selection minimises baseline differences *	Sample size calculation/ justification	Adequate description of the cohort	Valid method to assess attachment style	Valid method to assess social anxiety	Assessors blind to SA or attachment status	Adequate follow-up*	Missing data minimal	Control of confounders	Analysis appropriate *
Aderka et al. (2009)	Partial	N/A	No	Partial	Yes	Yes	Yes	N/A	Unclear	Yes	unclear
Anhalt & Morris (2008)	No	N/A	No	Yes	Yes	Yes	Yes	N/A	Unclear	Partial	unclear
Bifulco et al. (2006)	Partial	N/A	No	No	Yes	Yes	No	Yes	Partial	No	unclear
Boelen, et al. (2014)	No	N/A	No	Yes	Yes	Yes	unclear	N/A	Unclear	Yes	Yes
Bohlin & Hagekull (2009)	Yes	N/A	No	Partial	Partial	Yes	Yes	Yes	Partial	Yes	unclear
Dağ, & Gülüm (2013)	Unclear	Unclear	No	Partial	Yes	Yes	unclear	N/A	Unclear	Yes	Yes
Dakanalis et al., (2014)	Partial	N/A	Yes	Partial	Partial	Partial	Yes	N/A	Yes	no	unclear
Darcy, et al. (2005)	Partial	N/A	No	Yes	Yes	Yes	Yes	N/A	Unclear	Yes	unclear

Authors	Unbiased selection of cohort	Selection minimises baseline differences *	Sample size calculation/ justification	Adequate description of the cohort	Valid method to assess attachment style	Valid method to assess social anxiety	Assessors blind to SA or attachment status	Adequate follow-up*	Missing data minimal	Control of confounders	Analysis appropriate *
Eng et al., (2001)	Yes	Yes	No	Yes	Yes	Yes	unclear	N/A	Unclear	Yes	unclear
Erozkan (2009)	Unclear	N/A	No	No	Yes	Unclear	unclear	N/A	Unclear	No	unclear
Fan & Chang (2015) study 2	Partial	N/A	No	Yes	Yes	Yes	Yes	N/A	Unclear	Partial	unclear
Forston (2005)	No	N/A	No	Yes	Yes	Yes	Yes	N/A	Yes	No	unclear
Gajwani, et al. (2013)	Yes	N/A	No	Yes	Yes	Yes	Yes	N/A	Unclear	Partial	Yes
Greenwood (2008)	Unclear	N/A	No	No	Yes	Partial	Yes	N/A	Yes	No	unclear
Gülüm & Dağ (2013) study 1	Unclear	Unclear	No	Partial	Yes	Yes	unclear	N/A	Unclear	Yes	Yes
Gülüm & Dağ (2013) study 2	Unclear	Unclear	No	Partial	Yes	Yes	unclear	N/A	Unclear	Yes	Yes

Authors	Unbiased selection of cohort	Selection minimises baseline differences *	Sample size calculation/ justification	Adequate description of the cohort	Valid method to assess attachment style	Valid method to assess social anxiety	Assessors blind to SA or attachment status	Adequate follow-up*	Missing data minimal	Control of confounders	Analysis appropriate *
Hoyer et al., (2016)	Yes	N/A	Partial	Partial	Yes	Yes	unclear	N/A	Yes	No	unclear
Jordan (2010)	No	No	No	Yes	Yes	Yes	N/A	N/A	Yes	No	Partial
Kashdan & Roberts (2011)	Yes	Yes	No	Yes	Partial	Yes	Yes	N/A	Yes	Yes	Yes
Lionberg (2003) study 1	Partial	No	No	Partial	Yes	Yes	unclear	N/A	Unclear	Partial	unclear
McDermott et al., (2015)	Yes	N/A	Partial	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes
Michail & Birchwood (2014)	Yes	Yes	No	Yes	Yes	Yes	unclear	N/A	Unclear	No	unclear
Mickelson, et al. (1997)	Yes	N/A	Partial	Yes	Partial	Yes	No	N/A	Yes	No	unclear
Nikitin & Freund (2010) study 1	Partial	N/A	No	Partial	Partial	Partial	Yes	N/A	Unclear	Partial	unclear
Parade, et al. (2010)	No	Yes	No	Yes	Yes	Partial	Yes	Yes	Yes	No	Yes

Authors	Unbiased selection of cohort	Selection minimises baseline differences *	Sample size calculation/ justification	Adequate description of the cohort	Valid method to assess attachment style	Valid method to assess social anxiety	Assessors blind to SA or attachment status	Adequate follow-up*	Missing data minimal	Control of confounders	Analysis appropriate *
Roring (2008)	No	N/A	Unclear	Yes	No	Yes	Yes	N/A	Yes	No	unclear
van Buren & Cooley (2002)	Partial	Unclear	No	Partial	Partial	Yes	Yes	N/A	Unclear	No	unclear
Weisman et al. (2011) study 1	Partial	Yes	No	Partial	Yes	Yes	unclear	N/A	Unclear	Yes	unclear
Weisman et al. (2011) study 2	Yes	Partial	Partial	Partial	Yes	Yes	unclear	N/A	Unclear	Yes	unclear
Weisman, et al., (2011) SEM	Yes	N/A	No	Partial	Yes	Yes	Unclear	N/A	Unclear	Yes	Yes

* Criteria only applicable to certain designs

Table 3
Outcome data from exploration of relationship between social anxiety and attachment

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
Aderka, et al., (2009)	Spectrum of global social anxiety	Attachment insecurity	r = .39 **	-	-
			-	Non-significant (values not reported)	Social comparison; Submissive behaviour
Anhalt & Morris (2008)	Spectrum of global social anxiety	Attachment security	r = -.17 * - r = -.21***	β = -.11 - β = -.15	Gender; perceived parenting style; perceived attitudes towards child rearing - parenting behaviour
Bifulco et al. (2006)	Social anxiety 'caseness'	Attachment insecurity	r = .17 *	-	-
		Enmeshed attachment	r = .01	-	-
		Fearful attachment	r = .16 *	-	-
		Angry-Dismissive attachment	r = .10	-	-
		Withdrawn attachment	r = .10 [a]	-	-
Boelen, et al. (2014)	Spectrum of global social anxiety	Attachment anxiety	-	β = .11	Neuroticism; Attachment avoidance; Prospective intolerance of uncertainty; Inhibitory intolerance of uncertainty
		Attachment avoidance	-	β = .10	Neuroticism; Attachment anxiety; Prospective intolerance of uncertainty; Inhibitory intolerance of uncertainty

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
Bohlin & Hagekull (2009)	Social Interaction Anxiety and Social Phobia combined into global social anxiety measure	Attachment security	Non-significant (values not reported)	-	-
Dağ & Gülüm (2013) [b]	Spectrum of global social anxiety	Attachment anxiety	r = .23 ** - r = .26 **	β = .06 - β = .09	Attachment avoidance; Cognitive flexibility
		Attachment avoidance	r = .21 ** - r = .29 **	β = .16 * - β = .25 ***	Attachment anxiety; Cognitive flexibility
Dakanalis et al., (2014)	Spectrum of social interaction anxiety	Attachment anxiety	r = .52 ***	-	-
Darcy, et al. (2005)	Spectrum of global social anxiety	preoccupied attachment	r = .12 - r = .38 **	β = .02 - β = .26 **	Depressive symptoms; Fearful attachment
				β = -.04 - β = .18 *	Trait anxiety; Fearful attachment
				β = -.02 - β = .25 **	Anxiety sensitivity; Fearful attachment
		fearful attachment	r = .09 - r = .35 **	β = .02 - β = .19 *	Depressive symptoms; preoccupied attachment
				β = .04 - β = .11	Trait anxiety; preoccupied attachment
				β = .02 - β = .16 *	Anxiety sensitivity; preoccupied attachment
Eng et al., (2001)	Social anxiety 'caseness' Vs. healthy control	Attachment security	d = -.49 * - d = -1.16 ***	-	Groups matched on: Age; Gender; Race; Psychosis; Bipolar disorder; Organic mental disorders; Active substance dependence (within

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
					last 3 months)
		Attachment anxiety	d = 1.30 - d = 1.45	-	Groups matched on: Age; Gender; Race; Psychosis; Bipolar disorder; Organic mental disorders; Active substance dependence (within last 3 months)
		Attachment depend on others	d = -.45 - d = -.54	-	Groups matched on: Age; Gender; Race; Psychosis; Bipolar disorder; Organic mental disorders; Active substance dependence (within last 3 months)
		Attachment comfort with closeness	d = -1.15 - d = -1.21	-	Groups matched on: Age; Gender; Race; Psychosis; Bipolar disorder; Organic mental disorders; Active substance dependence (within last 3 months)
Erozkan (2009)	Spectrum of global social anxiety	Secure attachment group	r = -.42 **	Significant *** (effect size not reported)	Fearful attachment; Preoccupied attachment; Dismissive attachment
		Fearful attachment group	r = .45 **	Significant *** (effect size not reported)	Secure attachment; Preoccupied attachment; Dismissive

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
					attachment
		Preoccupied attachment group	r = .30 **	Significant *** (effect size not reported)	Secure attachment; Fearful attachment; Dismissive attachment
		Dismissive attachment group	r = .21 *	Significant ** (effect size not reported)	Secure attachment; Preoccupied attachment; Fearful attachment
Fan & Chang (2015) (study 2)	Social Interaction Anxiety and Social Phobia combined into global social anxiety measure	Attachment anxiety	-	β = .414 ***	Gender; Attachment avoidance
		Attachment avoidance	-	β = .088	Gender; Attachment anxiety
Forston (2005)	Spectrum of global social anxiety	Preoccupation with relationships	r = .37 **	-	-
		Need for approval	r = .49 **	-	-
		Relationships as secondary	r = .28 **	-	-
		Discomfort with closeness	r = .42 **	-	-
		Confidence	r = -.50 **	-	-
Gajwani, et al. (2013)	Social Interaction Anxiety and Social Phobia combined into global social anxiety measure	Attachment security	r = .39 ** - r = .47 ***	β = .23	Depression
			d = -1.00 - d = -1.08	-	-
		Secure Vs Preoccupied comparison	d = -1.16 - d = -1.30 *	-	-
		Secure Vs Dismissive comparison	d = -.29 - d = -.51	-	-
		Secure Vs Fearful comparison	d = -1.71 *** - d = -1.76 ***	-	-

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
Greenwood (2008)	Public and private self-consciousness	Attachment anxiety	r = .28 **	-	-
		Attachment avoidance	r = .02	-	-
Gülüm & Dağ (2013) study 1 [b]	Spectrum of global social anxiety	Attachment anxiety	r = .23 ** - r = .26 **	β = .16 ** - β = .19 **	Locus of control; Attachment avoidance
		Attachment avoidance	r = .21 ** - r = .29 **	β = .17 ** - β = .28 **	Locus of control; Attachment anxiety
Gülüm & Dağ (2013) study 2	Spectrum of global social anxiety	Attachment anxiety	r = .24 ** - r = .25 **	β = .14 ** - β = .16 **	Repetitive thinking; Attachment avoidance
		Attachment avoidance	r = .22 ** - r = .33 **	β = .21 ** - β = .33 **	Repetitive thinking; Attachment anxiety
Hoyer et al., (2016)	Spectrum of global social anxiety	Attachment anxiety	r = .20 **	-	-
		Attachment avoidance	r = .22 **	-	-
Jordan (2010)	Spectrum of global social anxiety	Attachment insecurity	r = .616 **	-	-
Kashdan & Roberts (2011)	Spectrum of global social anxiety	Attachment anxiety	No significant difference in attachment anxiety to therapy group between SA & no SA groups (values not reported)	-	SA and no SA groups matched on: clinically relevant depression; treatment completion; Age; Gender; Ethnicity
		Attachment avoidance	No significant difference in attachment avoidance to therapy group between SA & no SA groups (values not reported)	-	SA and no SA groups matched on: clinically relevant depression; treatment completion; Age; Gender; Ethnicity

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
Lionberg (2003) study 1	Social anxiety 'caseness' Vs. healthy control (total participants)	Attachment comfort with closeness	d = -1.44 **	-	**Social anxiety and healthy control groups matched on**: Age; Gender; Ethnicity; Parental marital status; Participant relationship status; Participant relationship duration; Schizophrenia diagnosis; MDD; OCD; substance dependence diagnosis; organic psychiatric disorders; high suicide risk; **Social anxiety and panic disorder groups matched on**: Age; Ethnicity; Parental marital status; Participant relationship status; Participant relationship duration; Treatment seeking for anxiety; Schizophrenia diagnosis; MDD; OCD; substance dependence diagnosis; organic psychiatric disorders; high suicide risk;
	Social anxiety 'caseness' Vs. Vs. healthy control (female participants only)		d = -1.03 *	-	
	Social anxiety 'caseness' Vs. Panic disorder 'caseness' (female participants only)		d = -.71 *	-	
	Social anxiety 'caseness' Vs. healthy control (total participants)	Attachment depend on others	d = -1.02 **	-	
	Social anxiety 'caseness' Vs. Vs. healthy control (female participants only)		d = -.83 *	-	
	Social anxiety 'caseness' Vs. Panic disorder 'caseness' (female participants only)		d = -.33	-	
	Social anxiety 'caseness' Vs. healthy control (total participants)	Attachment anxiety	d = 1.32 *	-	
	Social anxiety 'caseness' Vs. Vs. healthy control (female participants only)		d = 1.33 *	-	

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
	Social anxiety 'caseness' Vs. Panic disorder 'caseness' (female participants only)		d = .06	-	
McDermott et al., (2015)	Spectrum of global social anxiety	Attachment anxiety	r = .40 *** [c]	β = .21 ***	Attachment avoidance; Hope
		Attachment avoidance	r = .27 *** [c]	β = .06 **	Attachment anxiety; Hope
Michail & Birchwood (2014)	Social Interaction Anxiety and Social Phobia combined into global social anxiety measure	Insecure attachment overall	OR = 18.5	-	-
		Preoccupied attachment	OR = 1.5 [d]	-	-
		Dismissive attachment	OR = 0.4 [d]	-	-
		Fearful attachment	OR = 23.2 [d]	-	-
Mickelson, et al. (1997)	Social anxiety 'caseness'	Secure attachment group	Significant *** (standardised effect size not reported)	-	-
		anxious attachment group	Significant *** (standardised effect size not reported)	-	-
		avoidant attachment group	Significant *** (standardised effect size not reported)	-	-
		anxious/avoidant attachment comparison	Non-significant (standardised effect size not reported)	-	-

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
Nikitin & Freund (2010) (study 1)	Spectrum of social interaction anxiety	secure attachment	-	β = -.48 ***	Preoccupied attachment; Dismissive attachment; Fearful attachment; Social approach motivation; Social avoidance motivation; Social approach X avoidance motivation interaction
		Preoccupied attachment	-	Non-significant (values not reported)	Secure attachment; Dismissive attachment; Fearful attachment; Social approach motivation; Social avoidance motivation; Social approach X avoidance motivation interaction
		Dismissive attachment	-	Non-significant (values not reported)	Secure attachment; Preoccupied attachment; Fearful attachment; Social approach motivation; Social avoidance motivation; Social approach X avoidance motivation interaction
		Fearful attachment	-	Non-significant (values not reported)	Secure attachment; Preoccupied attachment; Dismissive attachment; Social approach motivation; Social avoidance motivation; Social approach X avoidance motivation interaction

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
Parade, et al. (2010)	Spectrum of social interaction anxiety	Attachment security	r = -.25 **	β = -.14	Ethnicity
Roring (2008)	Social Interaction Anxiety and Social Phobia combined into global social anxiety measure	Overall attachment	-	Significant predictor of SIAS & SPS (standardised values not reported) **	Perceived social support
		Secure attachment	r = -.25** - r = -.44**	Significant predictor of SIAS (standardised values not reported) **	Fearful attachment; Preoccupied attachment; Dismissing attachment
		Fearful attachment	r = .28** - r = .33**	Significant predictor of SPS (standardised values not reported) **	Secure attachment; Preoccupied attachment; Dismissing attachment
		Preoccupied attachment	r = .19** - r = .26**	Significant predictor of SIAS (standardised values not reported) **	Secure attachment; Fearful attachment; Dismissing attachment
		Dismissing attachment	r = .05 - r = .06	Non-significant (values not reported)	Fearful attachment; Preoccupied attachment; Dismissing attachment
van Buren & Cooley (2002)	Spectrum of global social anxiety	Secure attachment group Vs. Preoccupied attachment group	d = -.86 [z]	-	-
		Secure attachment group Vs. Dismissive attachment group	d = -.36 [z]	-	-

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
		Secure attachment group Vs. Fearful attachment group	d = -.88 [z]	-	-
Weisman, et al., (2011) (Study 1)	Spectrum of global social anxiety	Attachment anxiety	d = 1.15	-	Groups matched on: Age; Gender; Marital status; Occupational status; Schizophrenia diagnosis; MDD (excluded); substance dependence diagnosis;
		Attachment avoidance	d = 1.15 **	-	Groups matched on: Age; Gender; Marital status; Occupational status; Schizophrenia diagnosis; MDD (excluded); substance dependence diagnosis;
Weisman, et al., (2011) (Study 2)	Spectrum of global social anxiety	Attachment anxiety	d = 0	-	Groups matched on: Gender; years of education; Depression (included); Schizophrenia diagnosis; substance dependence diagnosis; treatment seeking for anxiety
		Attachment avoidance	d = 1.38	-	Groups matched on: Gender; years of education; Depression (included); Schizophrenia diagnosis; substance dependence diagnosis; treatment seeking for anxiety

Study	Comparison	Attachment variable	Bivariate association	Multivariate association	Control variables
Weisman, et al., (2011) (SEM)	Spectrum of global social anxiety	Attachment anxiety	r = .39 ***	β = .21 *	Attachment avoidance; Submissive behaviour; Social comparison
		Attachment avoidance	r = .49 ***	β = .27 *	Attachment anxiety; Submissive behaviour; Social comparison

NOTE: MDD = Major Depressive Disorder; OCD = Obsessive Compulsive Disorder;
* = p < .05; ** = p < .01; *** = p < .001; z = significance not reported
a = value corrected from published article through contact with author
b = studies used the same population
c = latent variables correlated
d = Cohen's d (Cohen, 1992); all Cohen's d effect sizes calculated from study data, but not reported in original paper
e = Values calculated with very low cell numbers; interpret with caution
r = correlation coefficient
β = standardised regression coefficient

Attachment and Social Anxiety

In total, 28 studies reported some significant association between attachment and social anxiety. Effect sizes ranged from negligible, $d = 0$, to large, $d = 1.76$ and $r = 0.616$.

Between group differences.

Six studies compared attachment across groups defined by clinical 'caseness' for social anxiety. In five of these, people meeting diagnostic criteria for social anxiety were significantly more likely to be insecurely attached in comparison with healthy control groups (*OR* = 18.5; $d = .49 – 1.38$; Eng et al. 2001; Lionberg, 2003; Weisman et al., 2011, study 1 & 2; Michail & Birchwood, 2014). However, Kashdan & Roberts (2011) observed no difference in attachment to therapeutic group and therapist between depressed service-users with or without social anxiety. This difference may be understood through the difference in attachment relationships explored.

In particular, people with social anxiety showed higher attachment anxiety ($d = 1.15 – 1.45$), lower comfort in closeness with attachment figures ($d = 1.15 – 1.44$) and lower ability to trust and depend on attachment figures than healthy controls ($d = .45 – 1.02$). However, two studies did not show a significant difference in attachment anxiety between social anxiety groups and other anxiety disorder groups ($d = 0 – 0.06$; Lionberg, 2003; Weisman et al., 2011, study 2). Elevated attachment avoidance ($d = 1.15$; Weisman et al., 2011) and reduced comfort with closeness to attachment figures ($d = -.71$; Lionberg, 2003) continued to distinguish socially anxious from other anxiety groups.

In $k = 7$ studies attachment was separated into secure, preoccupied, dismissive and fearful styles, with comparisons made between groups. Significant differences in social anxiety measures between groups suggested a relationship between attachment and social

anxiety. When styles were directly compared (k = 2), fearful attachment and secure attachment demonstrated the greatest difference in social anxiety scores (d = 0.88 – 1.76) with greater social anxiety in the fearful attachment group and less in the secure attachment group (van Buren & Cooley, 2002; Gajwani, et al., 2013). Secure attachment groups also tended to have lower levels of social anxiety than preoccupied/anxious (d = .86 – 1.30), and to a lesser extent dismissive/avoidant attachment groups (d = .36 – .51) suggesting dismissive/avoidant attachment has a smaller influence on social anxiety scores. The larger effect sizes were found in smaller populations who were also at ultra-high risk for psychosis. These scores may therefore not be generalizable to other populations, meaning the lower effect sizes may be more reliable.

Within group differences.

k = 15 studies explored cross-sectional correlations between attachment and social anxiety. All found a significant relationship, wherein attachment insecurity was positively correlated with social anxiety. Where attachment was considered on a single continuum from insecure to secure (k = 7), attachment was positively associated with social anxiety with correlations ranging from r = .17 to r = .62.

Significant effects disappeared when k = 4 studies controlled for other covariates (e.g., social comparison, submissive behaviour, depression, parenting style), with associations between overall attachment security and social anxiety ranging from β = -.11 to β = -.23 (Anhalt & Morris, 2008; Aderka et al., 2009; Parade, et al., 2010; Gajwani, et al., 2013). Anhalt and Morris (2008) reported the lowest effect size between attachment to parents and social anxiety, when controlling for ratings of perceived parenting style and perceived attitudes towards parenting. Arguably, these constructs could be thought to significantly

overlap with or even mirror parental attachment. Additionally, attachment to parents in young adults may play a less important role in adult social anxiety.

Findings were inconsistent when considering attachment anxiety and avoidance separately (*k* = 9). Overall effects were slightly larger between social anxiety and attachment anxiety (r = .23 – .52; β = .06 – .41) than attachment avoidance (r = .02 – .49; β = .06 – .33). However, when controlling for cognitive features (i.e. flexibility, locus of control, repetitive thinking), or evolutionary behaviour variables (i.e. submissive behaviour; social comparison), studies (*k* = 3) found slightly higher associations between social anxiety and attachment avoidance (β = .16 – β = .33) in comparison with attachment anxiety (β = .06 – β =.21; Weisman et al., 2011; Dağ & Gülüm, 2013; Gülüm & Dağ, 2013).

In *k* = 2 studies differences in effect size between attachment anxiety (β = .11) and attachment avoidance (β = .10) are negligible (Mickelson, et al., 1997; Boelen, et al., 2014). Furthermore, one well-powered study compared differences in social anxiety between attachment anxiety and attachment avoidance, no difference was found (Mickelson, et al., 1997), though the categorical assessment of attachment used in this study was very limited (Shi, et al., 2013). Boelen et al. (2014) found that when inhibitory intolerance of uncertainty, comparable to behavioural inhibition, and neuroticism are controlled, attachment anxiety and avoidance had no remaining relationship with social anxiety. As other studies found behavioural inhibition contributed to the social anxiety - attachment anxiety relationship, but attachment avoidance was maintained (Weisman et al., 2011), this suggests neuroticism may play a role in the relationship between attachment avoidance and social anxiety.

Where attachment was broken into secure, preoccupied, dismissive and fearful styles and within-group associations examined (*k* = 5), having a secure attachment was strongly, negatively associated with social anxiety (*k* = 4; r = -.42 – r = -.44; β = -.27 – β = -.48). Fearful attachment style was positively associated with social anxiety (*k* = 5; r = .09 – r = .45;

OR = 23.2). Two studies found non-significant relationships between social anxiety and fearful attachment, suggesting this association may be weaker than for secure attachment (Darcy, et al., 2005; Nikitin & Freund, 2010). Nikitin and Freund (2010) found the strongest effect for secure attachment and a non-significant effect for fearful attachment, when controlling for social approach and avoidance motivation, as well as the other attachment categories. However, this study only assessed social interaction anxiety, so results may not apply to people experiencing global social anxiety.

Moderation and mediation.

Nine cross-sectional studies tested indirect effects wherein the relationship between attachment and social anxiety was mediated by other variables. Significant indirect effects were reported with mediators including cognitive flexibility (Dağ & Gülüm, 2013), depression (Gajwani et al., 2013), social comparison, submissive behaviour (Aderka et al., 2009), locus of control, repetitive thinking (Gülüm & Dağ, 2013), hope (McDermott et al., 2015), social approach motivation and social avoidance motivation (Nikitin & Freund, 2010), and perceived social support (Roring, 2008). The association or overlap between these potential mediators has not been fully assessed, however.

In contrast with Gajwani et al. (2013), who suggested depression mediates the attachment – social anxiety link, other research has suggested that social anxiety mediates the relationship between attachment and depression (Eng et al., 2001; Aderka et al., 2009; Weisman et al., 2011). These contrasting findings likely reflect the limitations of testing mediational effects in cross-sectional data, where direction of effect cannot be established.

One study found that the relationship between attachment and social anxiety was moderated by race, with Caucasian students found to have less association between social anxiety and attachment than other ethnicities when grouped together (Parade, et al., 2010).

High attrition and lack of control for social anxiety limit the generalisability of these findings. The university in which this study took place could have influenced the role of race in attachment and social anxiety, as non-Caucasian students were a minority group (70% Caucasian; Parade, et al., 2010).

Longitudinal studies.

Three studies explored the relationship between adult attachment and social anxiety over time. They collectively suggest attachment may predict social anxiety over time with a small effect size ($r = .17 – r = .25$). Bifulco et al. (2006) selected participants with a greater risk for psychosocial difficulties due to traumatic earlier life-experiences, reporting a small significant effect size between attachment and social anxiety, when controlling for pre-existing social anxiety prior to a three year study period ($r = .17$). Bohlin and Hagekull (2009) found no significant association between attachment measured in infancy using the 'strange situation' (Ainsworth et al., 1978), and adult social anxiety. In this study the correlation between infant attachment and social anxiety in adulthood (21 years) was likely attenuated by the time delay between assessments.

Despite a positive association between attachment and social anxiety, the third study found this association disappeared when controlling for ethnicity between semesters one and two for a cohort of first year university students (Parade, et al., 2010). This discrepancy may be due to the populations sampled and high levels of participant attrition. High attrition was reported as students dropped-out from semester 1 to semester 2 of college, but no consideration was given for differences between participants who dropped out or refused to complete questionnaires at time 2, and those who did. Additionally this study failed to control for pre-existing social anxiety, meaning this finding must be interpreted with caution.

Discussion

This review synthesises literature exploring the relationship between attachment and social anxiety. 30 studies were identified, 28 of which suggested that attachment insecurity is positively associated with social anxiety. This effect was smaller when controlling for covariates (e.g. cognitive flexibility, social comparison) and in longitudinal research studies, limiting inferences about causality. The findings suggest that attachment experiences and learned behaviours may play a key role in the development social anxiety.

Seven studies categorised attachment into distinct styles. Interestingly, secure attachment had a strong negative relationship, and fearful attachment a strong positive relationship, with social anxiety. Secure attachment is characterised by low, and fearful attachment by high, attachment anxiety and avoidance (Brennan, et al., 1998; Ravitz et al., 2010). Preoccupied attachment (high attachment anxiety) was more strongly associated with social anxiety than dismissive attachment (high attachment avoidance; Ravitz et al., 2010). Attachment anxiety therefore may play a more substantive role than avoidance in the relationship between attachment and social anxiety, as was found in some within-participants studies (Greenwood, 2008; Erozkan, 2009; Fan & Chang, 2015; McDermott et al., 2015). This is consistent with findings between child/adolescent attachment and social anxiety (i.e. Brumariu & Kerns, 2008; 2010; Brumariu, et al., 2013). However, somewhat contradictory findings in studies conceptualising attachment on anxious and avoidant dimensions found both attachment anxiety and attachment avoidance explain additional variance in social anxiety when controlling for the other attachment dimension (Dağ, & Gülüm, 2013; Gülüm & Dağ, 2013; Fan & Chang, 2015; McDermott et al,. 2015). Contradictions may be explained by methodological differences: Several studies found that when controlling for cognitive or evolutionary behaviour variables, attachment anxiety was no longer significantly predictive

of social anxiety, whilst attachment avoidance maintained a significant relationship (Weismann et al., 2011; Dağ, & Gülüm, 2013; Gülüm & Dağ, 2013). This may indicate the relationship between social anxiety and attachment anxiety is a function of cognitive and/or evolutionary variables, though the direction of this effect is not clear from cross-sectional data.

Longitudinal studies provided evidence that attachment may account for subsequent changes in social anxiety. Evidence indicated, but was insufficient to conclude, that attachment variables affect the risk for developing social anxiety. Though no association was observed between infant attachment and adult social anxiety, research has shown that environment and interactions influence attachment throughout life (Fraley et al., 2013), which may attenuate the association between adult and child attachment. Additionally, lower associations between parental attachment and social anxiety in young adults (Anhalt & Morris, 2008) compared with studies measuring peer or romantic attachment (Eng et al., 2001; McDermott et al., 2015) suggest that parental attachment may contribute less to adult social anxiety. Darcy et al. (2005) support this hypothesis in their observation that partner preoccupied/anxious attachment was most predictive of social anxiety, with lower and often non-significant relationships between parental attachment and social anxiety when controlling for trait anxiety, anxiety sensitivity or mood.

Findings support an attachment-based theoretical conceptualisation of social anxiety, which incorporates evolutionary and cognitive underlying factors (Vertue, 2003). Attachment anxiety theoretically involves negative IWMs of self, which could lead to social anxiety both by informing expectations of social rejection (i.e., informing threat appraisals) and also guiding behavioural tendencies to avoid feared rejection by exaggerating affect (not necessarily consciously). In this review cognitive and evolutionary variables (e.g. cognitive flexibility; intolerance of uncertainty; social comparison; behavioural inhibition) were

suggested to mediate the relationship between attachment anxiety and social anxiety in line with extant cognitive and evolutionary theories of social anxiety (i.e. Gilbert, 2000; Clark & Wells, 1995) that explain the above processes by which attachment anxiety could predict social anxiety (Vertue, 2003). In contrast, people high in attachment avoidance theoretically hold negative IWMs of others (e.g., others as untrustworthy) which could inform expectations of rejection or hostility. This could explain links to social anxiety observed in the included literature, which are contradictory of child/adolescent research into attachment and social anxiety (Brumariu & Kerns, 2008; 2010). Self-report measures may capture defensive presentations as self-confident and -reliant people with avoidant attachments use to avoid hurt or rejection (Bartholomew, 1990) rather than their actual behaviour. This may mean psychosocial difficulties are underreported, and account for the smaller association between attachment avoidance and social anxiety. Fearful attachment styles theoretically involve negative IWMs of self and other, resulting in high attachment avoidance and anxiety (Ravitz et al., 2010). Dissonance between drives to both seek and avoid social contact may result in variance in social anxiety symptoms due to contextual influences on social approach and avoidance motivation (Nikitin & Freund, 2010). Momentary contextual processes could be studied as they influence social anxiety to elucidate processes by which it develops and is maintained.

The included studies also support research suggestions (Ruscio, 2010) to conceptualise a continuum of social anxiety symptoms based on severity of symptoms, functional impairment and distress. Clinical levels of social anxiety were associated with greater attachment insecurity, particularly fearful attachment. However, similar processes were observed underlying non-clinical and potentially prodromal social anxiety symptoms as participants beyond arbitrary clinical thresholds. Such findings would support the possibility

to identify people at risk of developing social anxiety to target prevention and more effective intervention based on underlying cognitive, behavioural and relational patterns.

This review highlights limitations within the included literature. The variety of assessment measures used to operationalise both attachment and social anxiety likely contributed to variability in the findings. Greater consistency between research groups on choice of attachment measures would therefore be beneficial. Research has shown that self-report and behavioural/observational measures of attachment are not highly correlated, suggesting they may be measuring separate constructs (Roisman et al., 2007; Ravitz et al., 2010). These two types of measures may explain unique variance in social anxiety and so could be used together in future research. Several studies used convenience samples of student populations, limiting the generalisability of findings. Though social anxiety can be conceptualised on a continuum with similar underlying processes at all levels (Ruscio, 2010), inclusion of greater clinical populations in future research in this area will allow for exploration of this conceptualisation and of attachment processes in people more significantly impaired. The overlap between social anxiety and depression was also not always ewll accounted for; high comorbidity between these constructs (Kessler, Petukhova, et al., 2012) means that without controlling for these effects, the extent of variance solely due to social anxiety is unclear. Indeed, exploring underlying processes such as attachment, cognitive and evolutionary behaviours in comorbid social anxiety and depression would be useful in future research. The paucity of longitudinal research limits the ability to draw conclusions regarding the direction of relationships. This appears to be an important next step for research in this area, alongside understanding what variables could moderate or mediate the relationship. Experience-sampling methods (Scollon, et al., 2009) which allow the exploration of moment-by-moment changes in social anxiety would also be beneficial here. Exploring suggested mediators of the relationship between attachment and social anxiety in the moment may

illuminate processes underlying social anxiety, and how these processes covary or interact. This would suggest avenues for intervention inaccessible to cross-sectional research.

Limitations

The findings of this review must be understood in the context of several limitations. Reviews included were limited to studies published in English, and this could have excluded several relevant studies from other languages and cultures. Studies exploring social anxiety and attachment in late adolescents were not included, and may have altered conclusions. However, adolescence is an important time in terms of the development of social anxiety, and so probably warrants a separate review. Meta-analysis was inappropriate as different theoretical approaches to assessing attachment meant findings were too heterogeneous, but this also limited our ability to infer population effect sizes from identified studies.

Clinical implications

Results support NICE (2013) recommended interventions such as CBT, through their action on cognitions and behaviours the research suggests may mediate the relationship between attachment and social anxiety. However, where NICE recommended CBT according to manualised approaches (i.e. Clark & Wells, 1995) may not result in remission of symptoms, research suggests considering attachment may allow for greater depth of intervention, consideration of IWMs and core-belief systems could facilitate greater engagement with therapy and present additional treatment options. Self-protective attachment behaviours, such as avoidance, appear to result in withdrawal or social anxiety when maladaptively applied. Additionally, identification of negative IWMs of self or other could trigger preventative interventions reducing social anxiety and the associated distress and economic burden. Greater consideration could also be given to reaching avoidant or fearfully

attached groups, who naturally may limit social contact. The effect of therapeutic relationships on attachment has also been demonstrated in the literature (Taylor, et al., 2015), suggesting that an active focus on engagement and developing a positive therapeutic alliance may be the most important step in reaching avoidant populations, whether presenting for social anxiety or other complaints.

Research suggests attachment injuries and traumatic experiences may facilitate identification of people potentially at risk for developing social anxiety, allowing for preventative intervention and normalising information to be communicated in a prodromal period. Indeed, given the prevalence of insecure attachment, this research presents a rationale for broader psychoeducation to young adults or university students about the prevalence and normality of social anxiety, as well as some potential coping strategies that could prevent clinical syndromes.

Conclusion

This is the first review of the literature exploring the relationship between adult attachment and social anxiety. It provides preliminary evidence that attachment insecurity, and particularly anxious attachment, are positively associated with social anxiety. However, more robust research assessing longitudinal relationships between peer/romantic attachment and social anxiety, as well as potential mediators of this relationship is needed to establish the direction of effect, and confirm hypotheses based on extant literature that attachment can result in social anxiety symptomology through cognitive and evolutionary variables.

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Preface to Empirical Paper

The present research paper forms part of a wider project exploring the relationship between motivation, social comparison, affect and psychopathology using an Experience Sampling Methodology (ESM). This project is a collaboration with researchers at the University of Liverpool, University of Manchester and the University of Lancaster. Trainees devised distinct research questions and aims, supported by their supervisor. The methodology adopted supported three projects, facilitating the use of a single set of measures and a single ESM-methodology. This allowed trainees to share participants, aiding recruitment. Each trainee aimed to recruit an $n = 30$, leading to a potential overall sample of $n = 90$. The same methodology was also undertaken at the University of Manchester and the University of Lancaster, leading to a potentially larger sample being obtained in the future.

Research, data analysis and write up were all conducted by the author, supported by the research supervisors. No collaboration between trainees was allowed. As such, this research paper describes a distinct project that benefitted from combined recruitment but no additional input from unnamed support.

Chapter 2: Empirical Paper

Title: Processes underlying social anxiety: Shame, social comparison and anxiety in the moment

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Abstract

Background: Several studies have explored the covariates of social anxiety, a common anxious condition with undesirable sequelae. Shame and social comparison are two variables demonstrated to be associated with social anxiety in research and theory. Momentary exploration of these variables in different contexts using Experience Sampling Methodology (ESM) could validate previous cross-sectional findings and elucidate active momentary processes in a common and disabling condition.

Method: Eighty-nine participants completed person-level questionnaires measuring attachment, social comparison, shame, social anxiety, depression and demographic variables. Participants also completed ESM diaries six times per day for six days, measuring anxiety, depression, shame, guilt and social comparison in the moment.

Results: In line with hypotheses, momentary anxiety was negatively associated with momentary social comparison and positively associated with shame when controlling for momentary depression and guilt. This finding was also present when exploring momentary anxiety experienced when with others, as opposed to when alone.

Limitations: A lagged model would allow exploration of momentary shame and social comparison predicting subsequent anxiety. A longer-term ESM might have bridged the gap between state and trait variables more comprehensively. Submissive behaviour was not included in the ESM, meaning the hypothesised processes of the social rank system were not fully assessed.

Conclusions: Making negative social comparisons and subjective momentary experiences of shame appear to function as two underlying processes in social anxiety. Implications for clinical practice and future research are discussed.

Keywords: Social anxiety, social comparison, shame, experience-sampling, social rank, evolutionary psychology

Highlights

- *Momentary anxiety is associated with momentary shame and social comparison.*
- *Momentary depression and guilt also significantly predicted momentary anxiety.*
- *Findings for momentary anxiety in social situations are not markedly different.*
- *Findings support evolutionary theories of social anxiety.*

Introduction

Social Anxiety Disorder is the second most common form of anxiety in adulthood, behind specific phobias, with a twelve month prevalence of 7.1%, clinical lifetime prevalence rate of 10.7% - 12.2% and lifetime morbid risk of 13% in western populations (Ruscio et al., 2008; Kessler, et al., 2012). Social Anxiety Disorder exists on a continuum with milder, sub-clinical levels of Social Anxiety (SA; Ruscio, 2010) that are also associated with significant distress and functional impairment (Wittchen, et al., 2000). Accordingly, SA will be considered on a continuum in this paper, in line with view that sub-clinical SA may represent a prodromal phase and increased risk for future distress and functional impairment (Ruscio, 2010). If untreated, SA can result in severely limited social interaction and lifestyle, with depression suggested to be a common result (Stein et al., 2001; Beesdo et al., 2007) as well as impairments to quality of life (Wittchen & Jacobi, 2005), romantic relationships (Sparrevohn & Rapee, 2009) and friendships (Davila & Beck, 2002). At the milder end of the SA continuum, rates of dispositional shyness are estimated to be as high as 61% amongst adolescents (Henderson, et al., 2014), with a quarter of all people reporting a significant lifetime social fear (Ruscio et al., 2008). However, though childhood shyness has been associated with SA in later life (Bohlin & Hagekull, 2009), clearly 61% of adolescents do not go on to experience significant functional impairments associated with SA. This paper aims to understand the underlying functions in SA, and guide prevention and intervention by understanding how momentary changes can result in SA.

Evolutionary psychology has suggested two separate social systems which have a role in SA: the social rank and social safety (affiliative) systems, which facilitate social competition for status/dominance and social cooperation for mutual benefit, respectively

(Gilbert, 2000; Trower & Gilbert, 1989; Weisman, et al., 2011). Socially anxious individuals are theorised to over-use social rank systems and under-use social safety systems, perceiving social interaction as hierarchical and often becoming hypervigilant to personal inadequacies that reinforce a negative view of the self (Aderka, et al., 2009; Gilbert, 2001). This has been evidenced in research showing socially anxious participants as very self-conscious in social situations (Brown, et al., 2007). The cognitive (Clark & Wells, 1995) and cognitive-behavioural (Rapee & Heimberg, 1997) models of SA are complementary to evolutionary-psychology theories in assuming negative schemata of self drive fears of negative evaluation by others, resulting in hypervigilance to social risk, defensive social behaviour and reduced actual and/or perceived social acceptance.

Beliefs of personal inferiority in SA suggest that shame likely plays a role (Clark & Wells, 1995; Gilbert, 2000; 2001). Shame is an emotional experience of one's self as inferior in reaction to a situation perceived as personally damaging or injurious (Miller, 2013, p. 16) and is often associated with the desire to hide, avoid or deny experience associated with the sense of inferiority. As a result, these people are less likely to access affiliative connections with peers, or feel supported in social situations (Weisman et al., 2011). Instead, people experiencing SA are more likely to see social situations as hierarchical, comparing their social status with others. Consequently these people are more likely to make negative comparisons due to negative self-beliefs, viewing others as dominant and threatening. Coping through avoidant or submissive self-protective behaviours that are motivated by feelings of shame helps to manage social situations and avoid rejection in the short term, but can exacerbate social problems if overused due to chronic feelings of shame and SA (Gilbert, 2000; Haker, et al., 2014; Weisman et al., 2011). It would be expected that momentary social

comparison, shame and anxiety will share a reciprocal relationship, representing the social rank system in operation.

Vertue (2003) advanced an overarching theory suggesting that underlying processes in SA, hypothesised by cognitive and evolutionary theories, could develop through attachment relationships. Research supports Vertue's (2003) thesis, as beliefs about personal inferiority and undesirableness can develop through attachment relationships (Brumariu, et al., 2013; Irons & Gilbert, 2005; Ollendick & Benoit, 2012). Research has also shown how parent rearing style and attachment can be influential in the development of SA, with insecure attachment a risk factor for development of several anxiety disorders, and secure attachment thought to be protective (Anhalt & Morris, 2008; Brumariu & Kerns, 2008; 2010; Kerns & Brumariu, 2014; Mickelson, et al., 1997). Studies have also demonstrated an association between insecure attachment and shame experiences (Gross & Hansen, 2000; Lopez, et al., 1997; Wei, et al., 2005). Overall, this suggests that exploring the role of shame in relation to attachment, social comparison and SA could aid understanding of the aetiology and maintenance of SA. This would support consideration of shame in psychological formulation and intervention for SA.

A relationship between adult attachment and social comparison has been established (e.g. Eng, et al., 2001), though this relationship may be mediated by other variables (Manning, et al., in preparation). Past research found that social comparison and submissive behaviour (Aderka et al., 2009), social approach and avoidance motivation (Nikitin & Freund, 2010), cognitive variables (Dağ, & Gülüm, 2013; Gülüm & Dağ, 2013) and hope (McDermott et al., 2015) mediated this relationship. Therefore, these processes could link attachment to SA, and when controlled for, we would expect little or no relationship between

attachment and SA. However, the relationship between these variables was explored at the trait level using self-report questionnaires.

Experience-Sampling Methodology (ESM) involves participants completing repeated assessments whilst functioning within their everyday context (Scollon et al., 2003). Alarms triggered at quasi-random times throughout the day, prompting participants to complete paper ESM diaries wherever and whenever they are. Momentary measurements have the advantage of allowing researchers to gather rich information about contextual subjective experience with high ecological validity. It also allows exploration of the temporal relationship between variables throughout a day, or over a series of days (Palmier-Claus et al., 2011). Despite these benefits, ESM has not been used in SA research before, but provides the opportunity to observe moment-to-moment relationships between shame and social comparison (described as 'momentary shame' and 'momentary social comparison') as these underlying processes should theoretically be active in all social situations. Such an approach would allow exploration of social rank processes as they operate, exploring whether momentary processes mirror person-level research in describing social comparison and shame as an overactive social rank system in people experiencing anxiety in social situations.

Hypotheses

1. Shame and social comparison, but not attachment, will be independent predictors of SA at the person level, when controlling for mood.
2. Anxiety will be positively associated with shame and social comparison in the momentary-level variables.

3. Momentary shame and social comparison will demonstrate a greater positive association with momentary anxiety when considered in social situations (operationalised as being with others), compared to hypothesis 2.

Method

Participants

An overall sample of 89 students was recruited from two large universities in the North of England through advertising emails, posts on electronic notice boards and posters. Interested participants contacted researchers by email. Responses included a standard email (Appendix D) and a participant information sheet (Appendix E) to read prior to arranging a first assessment appointment. Here, people agreeing to participate completed a consent form (Appendix F). For inclusion, participants had to be 18 years old or older, have access to a mobile device with the ability to receive texts, and have sufficient English to understand the language in the questionnaires. Participants were remunerated for their time with £15 shopping vouchers, and were also entered into a 'prize draw' to win a further £50 shopping voucher, in recognition of their effort in this labour-intensive methodology. The sample included 10 males and 79 females, with a mean age of 22.9 (SD = 4.8; minimum = 18, maximum = 40). Ethnically, the sample was 77.3% Caucasian, 13.6% Asian, 3.4% Black, 1.1% Mixed-race and 4.5% Other (one participant did not respond). Three participants began and did not complete the study; two females and one male who were all Caucasian. Reasons for attrition included mobile phones breaking (n = 1), and n = 2 participants failing to attend follow-up appointments and return ESM diaries.

Power

Power calculation for this multi-level model relies on five distinct parameters of level-1 data nested within level-2 data, making it very complicated (Snijders & Bosker, 2012). Researchers in the field recommend that 30 level-1 units (momentary assessment time-points) clustered within $n \geq 30$ level-2 units (in this case, participants) is adequate for non-biased significance tests of fixed effects (Kreft, 1996; Snijders & Bosker, 2012). The sample size of at least $n = 30$, with 36 level-1 data points clustered within each level-2 unit was therefore sought. Due to the multi-site recruitment procedure, $n = 89$ participants were ultimately included in multi-level analysis.

Materials

Person-level measures.

Relevant person-level assessments can be found in Appendices G and H, representing pre- and post-ESM assessment time-points respectively.

Attachment.

The Experiences in Close Relationships scale-Short form (ECR-S; Wei, et al., 2007) is a 12-item self-report measure of romantic attachment. Respondents indicate their agreement with statements about feelings/experiences in romantic relationships on a 7-point Likert scale anchored 1–disagree strongly to 7–agree strongly. The ECR-S was derived of the longer Experiences in Close Relationships scale (Brennan, et al., 1998) and has been shown to have comparable reliability and validity to the longer measure, containing two orthogonal 6-item scales for attachment anxiety ($\alpha = .78$; Wei et al., 2007) and attachment avoidance (α

= .84; Wei et al., 2007). Internal consistency of this measure was good for attachment anxiety (α = .76) and for attachment avoidance (α = .88) in the current sample.

Social comparison.

The Social Comparison Scale (SCS; Allan & Gilbert, 1995) includes 11 items assessed on a 10-point Likert scale concerning how one compares to others on a number of bipolar constructs (e.g., inferior–superior, incompetent–competent, weaker–stronger, unconfident–more confident). Lower scores indicate lower self-rated social status and rank. Research has shown the SCS is internally consistent in non-clinical populations (α = .91; Allan & Gilbert, 1995). The SCS has been used in several studies, demonstrating good reliability (Birchwood et al., 2007; Gilbert & Allen, 1998). Internal consistency of this measure was found to be α = .88 in the current sample.

Social anxiety.

The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998; α = .89) is a 20-item self-report measure of anxiety in social interaction situations. Agreement with a series of statements relating to SA are rated on a five-point Likert scale (0 = not at all, 4 = extremely). The Social Phobia Scale (SPS; Mattick & Clarke, 1998) is a 20-item companion scale to the SIAS, assessing socially anxious concerns of being scrutinized or judged during routine activities. The two scales discriminate between SA, other anxiety disorders and healthy control samples with good sensitivity (SIAS = .93; SPS = .89), positive predictive values (SIAS = .84; SPS = .86) and reasonable specificity (SIAS = .60; SPS = .66; Mattick & Clarke, 1998; Peters, 2000). Clinical cut-offs for the two scales have been found to be a score of 36 on the SIAS, and 26 on the SPS (Peters, 2000). They were used to measure person-level

SA. Both scales demonstrated good internal consistency, with the SIAS reporting α = .89 and SPS reporting α = .93.

Shame.

The Experience of Shame Scale (ESS; Andrews, et al., 2002) was used to provide a measure of trait shame. This self-report scale asks respondents to rate how much a series of shame statements apply to them on a four-point likert scale anchored 'not at all' – 'very much'. The ESS is comprised of three separate scales assessing shame in the domains of personal character, behaviour and appearance/body. The factor structure, concurrent and predictive validity of this measure has been supported (Andrews et al., 2002). Internal reliability of the separate scales were high in the current sample for characterological shame (α = .91), behavioural shame (α = .89) and bodily shame (α = .85) and overall the scale demonstrated very high internal consistency (α = .94).

Depression.

The Beck Depression Inventory-II (BDI-II; Beck, et al., 1996) was utilised to control for depression in participants, as the relationship between shame, social comparison and depression has been established in the literature (Taylor, et al., 2011). The BDI-II consists of 21 items and has been shown to demonstrate both reliability and validity in a student sample (Dozois, et al., 1998). This item showed good internal reliability in this sample (α = .88).

Moment-level measures (ESM).

A complete example of the ESM diary can be found in Appendix I.

Emotions.

Affect was measured by rating words/statements concerning different emotional states following the prompt "*I feel…*", on a seven point Likert scale, anchored 1 = "*Not at all*" to 7 ="*Very much*". Four items assessing anxiety (e.g., 'anxious') were adapted from recent research (Palmier-Claus et al., 2014, unpublished data) demonstrating high internal consistency in this sample (α = .81). A four-item low mood scale was also adapted from research (e.g. 'sad'; Palmier-Claus et al., 2014, unpublished data), demonstrating a high degree of internal consistency (α = .83). This was a control measure to account for the overlap between anxiety, shame, depression and social comparison.

Three items assessing shame (e.g. 'ashamed') were adapted from the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clarke, 1994). One further shame-focused item ('Like a bad person') was adapted from the State Shame and Guilt scales (Tangney & Dearing, 2002) forming a momentary shame scale with high internal consistency (α = .87). Notably, previous ESM measures of shame have confounded shame and guilt (e.g., Armey, et al., 2011) and so could not be used within this study. To account for overlaps between shame and guilt, four guilt-focused items were adapted from the State Shame and Guilt scales (e.g. 'Guilty'; Tangney & Dearing, 2002) and from the PANAS-X (Watson & Clarke, 1994) demonstrating high internal consistency (α = .90).

Social comparison.

Four items measured momentary social comparison, asking "how do you feel you compare to others at the moment", and responding on bivalent 7-point scales ranging from -3 to +3, anchored inferior – superior, less competent – more competent, less talented – more talented, less attractive – more attractive. These items are derived from social comparison scale items that demonstrated good loadings onto factors of social rank and social inclusion

(>.55) in a student sample on the 'social comparison' construct (Allan & Gilbert, 1995). The internal consistency for these items collectively was $\alpha = .87$.

Procedure

Ethical approval was gained prior to beginning recruitment (reference number: IPHS-1415-053), and the protocol was registered on the Open Science Framework to reduce publication bias (https://osf.io/kqwxe/). Participants attended an initial meeting where study procedures were explained with the opportunity to ask questions and practice the ESM part of the study in line with recommendations for ESM (Palmier-Claus et al., 2011). Informed consent was gained from all participants, who then completed a battery of questionnaires (demographics; BDI-II). They were provided with six A6-sized ESM diaries, each with six data-entry points, to be used one per day over six days. Participants received six text message alerts asking them to complete their ESM diary each day, at quasi-random times between 10AM and 10PM for six days (max $n = 36$ ESM data points). Researchers contacted participants by phone on the first day of the ESM to identify and respond to any problems with the procedure, and were available throughout the ESM by phone to troubleshoot problems.

Participants attended a follow-up appointment to return their diaries and completed a further questionnaire battery (ESS; SCS; ECR-S; SIAS; SPS) within three weeks of their first appointment. Participants were then debriefed and given a signposting sheet to local mental health services for any support needs raised during their participation in the study (Appendix J).

Data Analysis

ESM questionnaires completed more than 15 minutes after the corresponding text alert was sent were removed prior to analysis to avoid recall bias. Data in this study is hierarchically structured, where multiple momentary assessments (level 1) are nested within participants (level 2). Hypotheses were tested using multilevel regression as this method accounts for violated assumptions of data independence (Snijders & Bosker, 2012). Multi-level modelling was undertaken using Stata 14.1 (StataCorp, 2015). Following the recommendations of Snijders and Bosker (2012), analysis began with an 'empty' random-intercept model (where only the outcome is modelled). Predictors were then added to the model and the improvement in model parameters examined.

Results

Data Screening

Analysis showed a significant positive skew to scales measuring momentary guilt, shame, depression and anxiety, as may be expected in a community sample who are mostly symptom free, and so tend to score very low on clinical scales. The momentary social comparison measure indicated significant kurtosis, as participants rated these items '0' most frequently (mean = -0.54, range = -3 to +3). This is a common issue in ESM data, but robust standard errors applied through multi-level hierarchical regression reduce the limitations inherent in non-normal data (Huber, 1967; White, 1980). Person level scales of social interaction anxiety and social phobia also indicated a positive skew in residuals. Observations of data transformations indicated that social interaction anxiety residuals could be normalised

using a logarithm function. Social phobia residuals were normalised through use of a square-root function, to comply with parametric assumptions of hierarchical regression.

Person-level analyses were conducted on data from 89 participants, or lower numbers where participants did not complete all person-level measures. Momentary analyses were performed on 2312 data points, of a potential 3204, indicating a response rate of 72.2%. Where anxiety was limited to that considered only in social situations, analyses were performed on 1541 data points, representing 66.7% of the completed data, and 48% of the total potential data points.

Descriptive Statistics and Univariate Analysis

Table 1 presents descriptive statistics and Spearman's correlations of person-level measures for the 89 participants in the study. In line with previous research, measures of attachment anxiety and social interaction anxiety correlated significantly, as did attachment anxiety and avoidance with a measure of depression. Contradictory to past research, attachment measures did not significantly correlate with social phobia or social comparison measures.

Overall mean social anxiety scores for included participants were below the clinical range on both the SIAS (25.8) and SPS (14.6). Of the 89 participants, 17 scored above 36 on the SIAS and 16 scored above 26 on the SPS. Of these participants in the clinical range for SA, 11 scored in the clinical range on both SIAS and SPS, and a further 11 scored in the clinical range on either the SIAS or the SPS.

Table 1
Correlations and descriptive statistics of person-level variables

	Spearman's rho correlations										Descriptive Statistics		
	ECR-S anxiety	ECR-S avoidance	ESS character	ESS behaviour	ESS body	SIAS	SPS	SCS rank	SCS accept	BDI-II total	N	Mean	SD
ECR-S anxiety	1										86	22.942	7.126
ECR-S avoidance	.232*	1									85	16.471	7.725
ESS character	.215	.157	1								86	19.442	12.661
ESS behaviour	.045	.133	.669**	1							87	18.839	12.763
ESS body	.190	-.091	.450**	.373**	1						89	8.730	8.199
SIAS	.236*	.130	.615**	.567**	.419**	1					88	25.784	7.265
SPS	.201	.033	.512**	.559**	.412**	.773**	1				88	14.557	6.796
SCS rank	-.196	-.114	-.356**	-.257*	-.285**	-.542**	-.432**	1			89	40.740	7.931
SCS accept	-.208	-.076	-.463**	-.396**	-.369**	-.601**	-.515**	.776**	1		89	29.900	3.136
BDI-II	.283**	.218*	.428**	.422**	.351**	.438**	.454**	-.314**	-.318**	1	88	10.409	7.523

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

NOTE: Data limited to three decimal points; ; BDI-II = Beck Depression Inventory-II (Beck, et al., 1996); ECR-S = Experiences in Close Relationships scale-Short form (Wei et al., 2007); ESS = Experiences of Shame Scale (Andrews, et al., 2002); SCS = Social Comparison Scale (Allan & Gilbert, 1995); SIAS = Social Interaction Anxiety Scale (Mattick & Clarke, 1998); SPS = Social Phobia Scale (Mattick & Clarke, 1998).

Hypothesis 1: Shame and social comparison, but not attachment will be independent predictors of social anxiety at the person level, when controlling for mood

Hierarchical regression analysis was used to initially investigate whether adult attachment, trait shame and social comparison variables predicted variance in social interaction anxiety or social phobia, when controlling for depression and demographic variables (age, gender, ethnicity). Analyses of histograms and scatterplots indicated homoscedasticity and normal distribution of residuals. Table 2 shows that judging oneself to be not accepted by the social group remained a significant predictor of SA variance when controlling for depression and the other variables. Depression also significantly predicted social phobia, though not social interaction anxiety. Aside from this, no other person-level variables significantly predicted variance in SA. It should be noted that this regression analysis was performed on only $n = 77$ participants, due to 12 participants not completing all of the measures included in this analysis. This low number of participants may reduce the validity of statistical findings, meaning results must be interpreted with caution. The lack of significant relationship between shame scales and SA measures may be associated with the low number of participants, as beta values indicate some degree of positive relationship between shame and SA. Attachment measures did not predict variance in SA when depression, shame, and social comparison were entered into the model.

Table 2
Person-level variables as predictors of social interaction anxiety and social phobia

		Log SIAS total score						Square root SPS total score					
	IV	B	Std. Error	95% confidence intervals		Semi-partial r	β	B	Std. Error	95% confidence intervals		Semi-partial r	β
step 1													
(*n* = 87)	Age	-.022	.011	-.044	-.000	**-.213***	**-.214***	-.077	.039	-.155	.001	-.210	-.211
	Gender	.084	.178	-.271	.439	.050	.052	.004	.635	-1.259	1.267	.001	.001
	Ethnicity												
	White	.121	.130	-.137	.379	.100	.104	.713	.462	-.205	1.631	.164	.171
	Not white	Reference variable						Reference variable					
Step 2													
(*n* = 77)	Age	-.005	.009	-.024	.014	-.044	-.049	-.012	.035	-.082	.058	-.030	-.033
	Gender	.052	.149	-.246	.350	.029	.030	.280	.562	-.842	1.401	.043	.045
	Ethnicity												
	White	.117	.106	-.095	.329	.092	.099	.689	.396	-.101	1.479	.151	.161
	Not white	Reference variable						Reference variable					
	ECR anxiety	-.002	.006	-.015	.011	-.026	-.029	-.027	.024	-.076	.021	-.097	-.108
	ECR avoidance	.004	.006	-.008	.016	.055	.061	.001	.021	-.041	.044	.006	-.006
	ESS character	.014	.009	-.004	.032	.126	.199	.055	.036	-.016	.126	.133	.214
	ESS behaviour	.010	.006	-.002	.023	.135	.170	.037	.024	-.010	.084	.135	.171
	ESS body	.017	.017	-.017	.051	.082	.104	.100	.064	-.028	.128	.135	.170
	SCS rank	.008	.009	-.011	.028	.073	.143	.041	.035	-.028	.111	.103	.193
	SCS acceptance	-.029	.010	-.049	-.008	**-.233****	**-.438****	-.081	.038	-.156	-.006	**-.186***	**-.343***

BDI-II total	.012	.006	-.002	.025	.143	.180	.053	.025	.004	.103	**.186***	**.234***

NOTE: data limited to three decimal points; BDI-II = Beck Depression Inventory-II (Beck, et al., 1996); ECR = Experiences in Close Relationships scale-Short form (Wei et al., 2007); ESS = Experiences of Shame Scale (Andrews, et al., 2002); SCS = Social Comparison Scale (Allan & Gilbert, 1995); SIAS = Social Interaction Anxiety Scale (Mattick & Clarke, 1998); SPS = Social Phobia Scale (Mattick & Clarke, 1998). * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$, significant relationships highlighted in **bold** typeface.

Table 3

Multi-level regression predicting momentary anxiety from other momentary variables at the same time point

		Dependent variable				
		Momentary anxiety				
	Independent variables	B	Std. Error	95% confidence intervals		β
Step 1						
(*n* = 2386)	Momentary depression	.457***	.019	.419	.495	.395***
	Momentary guilt	.315***	.031	.254	.376	.212***
Step 2						
(*n* = 2312)	Momentary shame	.218***	.042	.135	.301	.151***
	Momentary social comparison	-.087**	.030	-.146	-.028	-.049**
	Momentary depression	.417***	.020	.377	.457	.360***
	Momentary guilt	.153***	.043	.068	.238	.103***

NOTE: Data limited to three decimal points. * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$

Hypothesis 2: Anxiety will be predicted by shame and social comparison in the momentary-level variables

Multi-level hierarchical regression performed on momentary variables was based on the number of completed data points for each scale, with control variables entered first, followed by predictors in line with this hypothesis. When combined, 2312 momentary data points were included in the multi-level analysis from the 89 participants (Table 3). At the momentary level shame (β = .15) and social comparison (β = -.05) predicted small but significant variance in anxiety, indicating that as shame increased and social comparisons were more negative momentary anxiety increased, though causality cannot be inferred. Control variables depression and guilt were also significant predictors, with depression the biggest predictor of momentary anxiety (β = .36). The small but significant relationship between social comparison and anxiety may reflect the non-clinical sample, as most participants responded ‘0’ to this bivalent scale. Wald tests indicated that both shame and social comparison significantly improved the predictive power of the model, over and above

that provided by control variables alone ($\chi^2 = 38.58$, $p < 0.001$). Re-running analyses using robust standard error values did not result in significantly different outcomes, indicating the multi-level model was unbiased (Maas & Hox, 2004).

Table 4
Multi-level regression predicting momentary anxiety in social situations from other momentary variables at the same time point

		Dependent variable				
		Momentary anxiety				
	Independent variables	B	Std. Error	95% confidence intervals		β
Step 1						
(*n* = 1577)	Momentary depression	.446***	.025	.397	.494	0.385***
	Momentary guilt	.328***	.037	.256	.400	0.221***
Step 2						
(*n* = 1541)	Momentary shame	.222***	.051	.123	.321	0.154***
	Momentary social comparison	-.082*	.035	-.150	-.013	-0.046*
	Momentary depression	.410***	.026	.359	.460	0.354***
	Momentary guilt	.161**	.052	.060	.263	0.109**

NOTE: Data limited to three decimal points. * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$

Hypothesis 3: Momentary shame and social comparison will predict greater variance in momentary anxiety when considered in social situations (operationalised as being with others), compared to hypothesis 2

The above multi-level hierarchical regression was repeated on a subsample of data where anxiety was measured in social situations (i.e. when participants rated themselves to be with others, rather than alone). Results were almost identical to overall momentary anxiety, with marginal increases when predicting momentary anxiety limited to social situations from momentary shame, and marginal decreases predicting momentary anxiety in social situations from momentary social comparisons. This suggests there is little difference between the predictive power of shame and social comparison in social contexts and when alone (Table

4). As above, re-running analyses using robust standard error values did not result in significantly different outcomes, indicating the multi-level model was unbiased (Maas & Hox, 2004).

Discussion

The aim of this study was to investigate the momentary processes underlying SA. Based on cognitive and evolutionary theories (Clark & Wells, 1995; Gilbert, 2000; Rapee & Heimberg, 1997), social comparison and shame were hypothesised to play an important role. One aim was to replicate past research findings at the person-level that linked trait shame, social comparison and attachment with SA. Another aim was to explore anxiety experienced in the moment, particularly in social situations, and how this relates to momentary shame and social comparison. An ESM approach allowed exploration of the relationship between these variables, whilst controlling for the influence of momentary depression and guilt, which are known covariates with shame and SA.

Consistent with hypotheses, correlational results demonstrated some significant associations of attachment, shame and social comparison with SA. In line with past research (e.g. Aderka et al., 2009), the relationship between attachment and SA disappeared when social comparison, shame and depression were entered into a hierarchical regression model. Though the model did not replicate past research in finding associations between trait shame and SA, a trait of judging oneself more negatively compared to others significantly predicted variance in social interaction anxiety and social phobia. Depression similarly predicted some variance in SA, though past research has suggested that the direction of this effect may be reversed: that SA precedes the development of depression (Stein et al., 2001; Beesdo et al., 2007).

Momentary data demonstrated that shame and social comparison significantly predicted variance in anxiety in the moment, both in general and in anxiety experienced in social situations. This suggests that comparing oneself negatively with others, and feeling shame in the moment may form part of the underlying processes in SA. By extension, and given that this study sample was drawn from the community, it suggests that social comparison and shame processes may be ongoing in each of us at different times, and intervening before maladaptive coping strategies such as avoidance and isolation develop could prevent SA.

Gilbert (2000) posited that shame, SA and depression were the result of making negative evaluations of our social status, and behaving submissively as a result of these evaluations to avoid conflict and rejection. Operationalised as the social rank system, it is thought to be over-developed in several mental health problems (e.g. depression; Cheung, et al., 2004; Taylor et al., 2011). Evolutionary psychology discusses the importance of social interaction and inclusion to our wellbeing, based on our development as a species into a mutually dependent 'pack' (Baumeister & Leary, 1995; Trower & Gilbert, 1989). By interrupting processes that may ultimately lead to pathological avoidance and fear of social interaction, distress and functional impairment may be truncated. This study also provides evidence for the action of these processes in the experience of momentary anxiety, suggesting in-the-moment interventions of cognitive restructuring around beliefs about status or willingness to have thoughts of self as lower status to focus on pursuit of other values (Craske et al., 2014), or increasing self-compassion and soothing (Werner et al., 2012) could potentially act as preventative interventions in sub- or pre-clinical populations, as they have been suggested to aid clinical SA. Similarly, psychoeducation about the ubiquity of shyness,

social comparison and feelings of shame may mitigate against these common evolutionary processes becoming pathological.

Attachment relationships and experiences have been suggested as one means to understand the development of SA (Vertue, 2003). Negative internal working-models of self and others are conceptualised to result in social withdrawal and/or awkward social interactions due to beliefs of impending social rejection. Past research has linked attachment with the development of SA through negative social comparisons and submissive behaviour (Aderka et al., 2009). Attachment styles have also been linked to the development of shame and low self-esteem (Passanisi, et al., 2014), which may be fundamental processes that link attachment and SA, though further research is needed to establish this relationship.

Limitations

The findings from this study were limited by a number of factors. First, the relatively low number of participants recruited from a university student body may limit the statistical power and external validity of person-level findings, particularly in comparison with people experiencing clinical levels of SA.

Second, measuring attachment using the ECR-S may have confused adult attachment findings. The ECR-S invites responses about behaviour in romantic relationships, or for people without current or historic romantic relationships, guesses about behaviour are requested. This may limit accuracy due to self-report bias, as well as error from people who are unable to accurately predict their behaviour in romantic relationships. Twelve participants did not complete the ECR-S, which may be due to inexperience in romantic relationships and choosing not to respond. Additionally, self-report assessment of attachment may actually tap

a separate construct of self-rated attachment that does not show a great deal of association with interview- or observation-rated attachment (Roisman et al., 2007). As such, attachment findings must be interpreted with caution.

Third, though ESM measures of shame, social comparison and guilt were all derived of valid and reliable trait scales, the momentary scales are not validated. Moreover, momentary SA was inferred from the validated momentary anxiety scale ratings when with other people. This was a somewhat inelegant assumption, as anxiety can be experienced when with other people that is not due to SA. However, as no scales have been established and validated in the extant literature, this appears reasonable. The cross-validation of findings in both momentary- and person-level data suggests this effect may be expected. Nevertheless, social anxiety as a concept may be better understood in retrospect rather than in the moment, where cumulative experiences make the role of context clearer. The high association between momentary variables suggests there is a chance they are not be measuring distinct constructs, and a separate paper is needed to validate momentary variables for use in future studies.

Fourth, past research has established social comparison alongside submissive behaviour as an enactment of an active social rank system. Future research could combine these variables with momentary shame to explore the entire system in momentary data. If a study could combine this with a momentary assessment of affiliation, particularly in a clinical sample, then comparisons could provide better understanding of the ongoing processes that may underlie SA.

Clinical Implications

Momentary shame and social comparison predict momentary anxiety, mirroring relationships between these variables when assessed as person-level traits. These findings support the research evidence for the efficacy of cognitive-behavioural intervention targeting cognitive processes such as social comparison (Mayo-Wilson, et al., 2014) and clinical recommendations based on this research (NICE, 2013). In cases where CBT according the Clark and Wells (1995) model may not result in remission of clinical symptoms (24-34% of research populations; Clarke et al., 2006; Stangier et al., 2011), inclusion of shame and social comparison in formulations of SA could help explain elements of variance and provide new opportunities for intervention. Additionally, recognition of shame and social comparison as potential risk factors for the development of SA could suggest preventative interventions in people struggling with comorbid difficulties, or more broadly in populations identified who may struggle through a screening process. As SA may be a process that is appreciated retrospectively, bringing awareness to ongoing processes may present greater options for therapeutic work. Even psychoeducation about these processes may help sufferers to begin to recognise their own behaviours that maintain their feelings and the necessity for safety behaviours such as avoidance and social withdrawal.

ESM methodology reflects the use of diaries to gather information common in cognitively-oriented therapeutic approaches. As such a similar ESM diary and methodology could be adapted from this study to capture this information when working clinically, and monitor change in social comparison behaviour and intolerance of shame experiences theorised to perpetuate social anxiety (Gilbert, 2000; Vertue, 2003).

Future Research

A useful extension of this research project would be to explore similar variables incorporating a clinical population. The addition of variables to assess submissive behaviour and affiliative behaviours in the moment could also elaborate on findings, helping to draw more comprehensive conclusions around the action of social rank and affiliation systems in action. Adopting similar approaches to understand other forms of psychological distress could help elucidate underlying processes that present a valid alternative to reductionist approaches to mental ill health.

Attachment could also be better understood from a momentary perspective. Exploring how and why different attachment styles and behaviours are expressed in different contexts could help explain how the exploration and safety seeking elements of attachment are expressed in adulthood. Alternatively, it could help explain how attachment processes and styles change through important relationships, as the literature has indicated (Taylor, et al., 2015).

Conclusions

This study has observed an association between momentary anxiety, shame and social comparison that mirrored person-level correlations between these variables. Momentary anxiety in social situations demonstrated little difference from overall social anxiety in relationship to momentary shame, social comparison, mood and guilt. These findings support evolutionary psychology theories about the development of social anxiety through over-activation of the social rank system. Future studies could observe this alongside an

operationalised social affiliation system and/or in a clinical population to extend findings and make them more robust.

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Appendices

Appendix A: Journal of Affective Disorders guidance for authors

Description

The Journal of Affective Disorders publishes papers concerned with **affective disorders** in the widest sense: **depression, mania, anxiety and panic**. It is interdisciplinary and aims to bring together different approaches for a diverse readership. High quality papers will be accepted dealing with any aspect of affective disorders, including biochemistry, pharmacology, endocrinology, genetics, statistics, epidemiology, psychodynamics, classification, clinical studies and studies of all types of treatment.

Language (usage and editing services)

Please write your text in good English (American or **British usage is accepted**, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's WebShop.

Submission

Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

Types of Papers

The Journal primarily publishes:
Full-Length Research Papers (up to 5000 words, excluding references and up to 6 tables/figures)
Review Articles and Meta-analyses (up to 8000 words, excluding references and up to 10 tables/figures)
Short Communications (up to 2000 words, 20 references, 2 tables/figures)
Correspondence (up to 1000 words, 10 references, 1 table/figure).
At the discretion of the accepting Editor-in-Chief, and/or based on reviewer feedback, authors may be allowed fewer or more than these guidelines.

Preparation of Manuscripts

Articles should be in English. The title page should appear as a separate sheet bearing title (without article type), author names and affiliations, and a footnote with the corresponding author's full contact information, including address, telephone and fax numbers, and e-mail address (failure to include an e-mail address can delay processing of the manuscript).
Papers should be divided into sections headed by a caption (e.g., Introduction, Methods, Results, Discussion). A structured abstract of no more than 250 words should appear on a separate page with the following headings and order: Background, Methods, Results, Limitations, Conclusions (which should contain a statement about the clinical relevance of the research). A list of three to six key words should appear under the abstract. **Authors should note that the 'limitations' section both in the discussion of the paper AND IN A STRUCTURED ABSTRACT are essential. Failure to include it may delay in processing the paper, decision making and final publication.**

Figures and Photographs

Figures and Photographs of good quality should be submitted online as a separate file. Please use a lettering that remains clearly readable even after reduction to about 66%. For every figure or photograph, a legend should be provided. All authors wishing to use illustrations already published must first obtain the permission of the author and publisher and/or copyright holders and give precise reference to the original work. This permission must include the right to publish in electronic media.

Tables

Tables should be numbered consecutively with Arabic numerals and must be cited in the text in sequence. Each table, with an appropriate brief legend, comprehensible without reference to the text, should be typed on a separate page and uploaded online. Tables should be kept as simple as possible and wherever possible a graphical representation used instead. Table titles should be complete but brief. Information other than that defining the data should be presented as footnotes.
Please refer to the generic Elsevier artwork instructions:http://authors.elsevier.com/artwork/jad.

Abstract

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Highlights

Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). You can view example Highlights on our information site.

Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Abbreviations

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules.

References

Citation in text

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Reference management software

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley and Zotero, as well as EndNote. Using the word processor plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If

no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
http://open.mendeley.com/use-citation-style/journal-of-affective-disorders
When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.

Reference style

Text: All citations in the text should refer to:
1. *Single author:* the author's name (without initials, unless there is ambiguity) and the year of publication;
2. *Two authors:* both authors' names and the year of publication;
3. *Three or more authors:* first author's name followed by 'et al.' and the year of publication.
Citations may be made directly (or parenthetically). Groups of references should be listed first alphabetically, then chronologically.
Examples: 'as demonstrated (Allan, 2000a, 2000b, 1999; Allan and Jones, 1999). Kramer et al. (2010) have recently shown ....'
List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.
Examples:
Reference to a journal publication:
Van der Geer, J., Hanraads, J.A.J., Lupton, R.A., 2010. The art of writing a scientific article. J. Sci. Commun. 163, 51–59.
Reference to a book:
Strunk Jr., W., White, E.B., 2000. The Elements of Style, fourth ed. Longman, New York.
Reference to a chapter in an edited book:
Mettam, G.R., Adams, L.B., 2009. How to prepare an electronic version of your article, in: Jones, B.S., Smith , R.Z. (Eds.), Introduction to the Electronic Age. E-Publishing Inc., New York, pp. 281–304.
Reference to a website:
Cancer Research UK, 1975. Cancer statistics reports for the UK.
http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/ (accessed 13.03.03).

Appendix B: Email sent to included authors and important authors in the field seeking further publications to consider for inclusion

Dear Insert author's name here,

We are currently undertaking a systematic review of the research literature concerning the relationship between attachment and social anxiety disorder. During our literature search we identified your paper, entitled "*Insert relevant paper title here*" which appears relevant to our review. I am emailing to check if you have undertaken any further work, either published or unpublished, which meets the following criteria:

- *Uses quantitative measures of attachment and social anxiety/social phobia*
- *The association between Attachment and social anxiety data is analysed*
- *Adult population (e.g, sample aged 18 years or over)*

If so, we would greatly appreciate it if you could send us any articles/reports relating to this work to consider for inclusion in this review. Many thanks for your time.

Ray Manning

Trainee clinical psychologist
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Appendix C: Systematic Review Quality Assessment Tool

Quality of observational studies

General instructions: Grade each criterion as "Yes," "No," "Partially," or "Unsure." Factors to consider when making an assessment are listed under each criterion. Note that some criteria will only apply to specify types of study. For example, power calculations are relevant for studies aiming to compare attachment or social anxiety between two groups, or studies that look at correlates of social anxiety in an insecurely attached sample. However, power calculations are not relevant in an uncontrolled study of a single socially anxious sample where attachment related data is only described (rather than featuring in any inferential statistics). Where a criterion only applies to a specific design, it is in italics.

1. *Unbiased selection of the cohort?*
    Factors that help reduce selection bias:
    - *Inclusion/exclusion criteria*
        - *Clearly described*
        - *Criteria for separating groups based on social anxiety or attachment style are stated or referred to in reference to past research*
    - *Recruitment strategy*
        - *Clearly described*
        - *Sample is representative of the population of interest: How representative of the general population is the study sample (i.e. people with social anxiety sampled represents all people with social anxiety)*

2. *Selection minimizes baseline differences in demographic factors (For controlled studies only)?*
    Factors to consider:
    - *Was selection of the comparison group appropriate? Consider whether these two sources are likely to differ on factors related to the outcome (other than degree of social anxiety or attachment style). Note that in instances of attachment insecurity or social anxiety versus secure or non-clinical controls, differences in clinical characteristics may be expected, but matching on key demographics (age, gender, ethnicity, education, etc.) would still be required to minimize bias.*
    - *Did the study investigators do other things to ensure that exposed/unexposed groups were comparable, e.g., by using stratification or propensity scores?*

3. *Sample size calculated (for controlled studies and where studies test for predictors/correlates of social anxiety/attachment style)?*
    Factors to consider:
    - *Did the authors report conducting a power analysis or describe some other basis for determining the adequacy of study group sizes for the primary outcome(s) of interest to us?*

- *Did the eventual sample size deviate by ≤ 10% of the sample size suggested by the power calculation?*

4. *Adequate description of the cohort?*

   Consider whether the cohort is well-characterized in terms of baseline demographics?

   - *Consider key demographic information such as age, gender and ethnicity.*
   - *Information regarding education or socio-economic characteristics is also important.*

5. *Validated assessment of attachment style?*

   Factors to consider:

   - *Was the method used to ascertain attachment style clearly described? (Details should be sufficient to permit replication in new studies)*
   - *Was a valid and reliable measure used to assess attachment? (self-report measures tend to have lower reliability and validity than clinical interview). Gold standard tools include the Adult Attachment Interview (AAI).*

6. *Validated method for assessing social anxiety?*

   Factors to consider:

   - *Was social anxiety assessed using valid and reliable measures? Note that measures that consist of subscales taken from larger measures, or scales intended for use in conjunction with other scales may lack content validity and reliability, failing to capture social anxiety and social phobia symptoms comprehensively. Gold standard tools include the Anxiety Disorders Interview Schedule (ADIS) and the Structured Clinical Interview for DSM-IV (SCID).*
   - *Were these measures implemented consistently across all study participants?*

7. *Outcome assessment blind to exposure ?*

   - *Were the study investigators who assessed outcomes blind to the UHR status of participants? (Note that even in single-arm studies so degree of blinding is possible, for example using external interviewers with no knowledge of participants clinical status).*

8. *Adequate follow-up period (longitudinal studies only)?*

   Factors to consider:

   - *Follow-up for effects of intervention is required to assess endurance of clinical change.*

9. *Missing data*

   Factors to consider:

   - *Did missing data from any group exceed 20%?*
   - *In longitudinal studies consider attrition over time as a form of missing data. Note that the criteria of < 20% missing data may be unrealistic over longer follow-up periods.*
   - *If missing data is present and substantial, were steps taken to minimize bias (e.g., sensitivity analysis or imputation).*

10. *Analysis controls for confounding (controlled studies and where studies test for predictors/correlates of attachment style or social anxiety)?*

    Factors to consider for controlled studies:

- *Does the study identify and control for important confounding variables and effect modifiers? Confounding variables are risk factors that are correlated with attachment style and social anxiety and may therefore bias the estimation of the effect of attachment on social anxiety if unmeasured. These may include demographic and clinical variables (e.g., co-morbidity).*

11. *Factors to consider for studies looking at predictors of social anxiety within insecurely attached groups:*
    - *Did the study control for likely demographic and clinical confounders? For example, using multiple regression to adjust for demographic or clinical factors likely to be correlated with predictor and outcome?*
12. *Analytic methods appropriate (Controlled studies and where studies test for predictors/correlates of attachment style and social anxiety)?*

    Factors to consider:
    - *Was the kind of analysis done appropriate for the kind of outcome data (categorical, continuous, etc.)?*
    - *Was the number of variables used in the analysis appropriate for the sample size? (The statistical techniques used must be appropriate to the data and take into account issues such as controlling for small sample size, clustering, rare outcomes, multiple comparison, and number of covariates for a given sample size)*

Appendix D: Response email to interested participants

Hi [redacted],

Thanks for getting in touch - it's great to hear from you.

I wonder how much information you have had about the study? I've attached a participant information sheet to this email but our research team would be happy to discuss any details with you further, either over the phone or via email.

Participation in the study can begin at any time, and takes around a week. When piloting it, we have found it isn't too intrusive, just involving completion of questions from a pocket-sized booklet at various points throughout each day as you go about your normal life. We arrange a time to meet before and after the week to meet and discuss the study, answer any questions you have, and complete some different questionnaires. I'll be available by phone to answer any questions and support your participation throughout the testing week. We're aware this sounds like a lot to do, which is why we give a £15 shopping voucher as a thank you to participants.

That being said, you're completely free to stop completing the booklet and leave the study at any point without giving a reason, and with no negative consequences. You can also request that your questionnaire data be destroyed (though after your data has been anonymised it will be impossible to identify and remove from our database).

If you have any more questions, please feel free to contact me. If you are interested in taking part in the study, please respond to this email and we can arrange a time to meet for the first appointment. As I have already said, there is no obligation to go ahead with the study now or following future meetings.

Thanks for your interest,

[redacted]

Trainee Clinical Psychologist
Doctorate in Clinical Psychology
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Appendix E: Empirical study Participant Information Sheet

Participant Information Sheet

Psychological difficulties in the moment: The role of shame, social comparison and goal progress

You are being invited to take part in a research project. Before you decide whether you would like to take part, it is important for you to know why the research is being done and what it will involve. Please read the following information carefully, with others if you wish. Please feel free to speak to the researchers about any questions you have or if you would like more information.

Thank you for your time.

What is the research for?
This research project is interested in using a technique called 'Experience Sampling Methodology (ESM)'. ESM is a relatively new methodology which looks at people's thoughts and feelings on a *moment-by-moment* basis. This is done by asking participants to answer some questions in their ESM diaries at random time points throughout the day. The aim of the research is to understand how a number of common psychological difficulties may be related to particular emotions and thinking patterns that occur in our day-to-day lives.

What will I be asked to do?
This study will involve answering some questions about your thoughts, feelings, behaviour and experiences. Initially, we will meet you at a location of mutual convenience. You will be asked for some personal details (e.g. age, ethnicity, phone number) and to fill in some questionnaires. This initial session will take no longer than one hour.

Following the initial assessments, we'd like you to fill in two pages in a paper diary when prompted by text messages sent to your mobile phone (example question: "I feel sad" rated on a scale from 'Not at all' to 'Very'). This will occur at six semi random-times per day between 10AM and 10PM for six days. Each complete entry should take no longer than one minute to fill in and we will go through some practice questions with you before you start.

We will meet with you following completion of the diaries to retrieve your responses and give you some further questionnaires to complete. This second session will take no longer than one hour.

Who is doing the research and who has approved it?
The research is being carried in collaboration between the University of Liverpool and University of Manchester. This work is being supervised by Dr Peter Taylor (Clinical Psychologist and lecturer at the University of Liverpool) and Dr Joanne Dickson (Senior lecturer and research director at the University of Liverpool) and Dr Sandra Bucci (Lecturer and Clinical Psychologist at the University of Manchester). The research is being undertaken by trainee clinical psychologists from the University of Liverpool and postgraduate Research Assistants from the University of Manchester.

Why have I been offered the chance to take part?
You have been offered the chance to take part because you are currently a student at either the University of Liverpool or the University of Manchester.

Do I have to take part?
No, it is up to you whether you would like to take part. If you do decide to participate you are free to withdraw at any time without a reason.

What are the possible disadvantages of taking part?
As part of the research, participants will be asked to complete measures relating to their mood and feelings. For some individuals completing such measures may be uncomfortable or lead to feelings of distress. Participants have the option to withdraw from the research at any point and do not need to answer any questions they do not wish to. All participants will be offered information about sources of support should they need it. Dr Peter Taylor and Dr Sandra Bucci are qualified Clinical Psychologists and will be able to discuss any concerns participants may have.

Will there be benefits to taking part?
Taking part in this research will allow you to try out a new and exciting research methodology: Experience Sampling Methodology (ESM). The results of the research will help inform interventions (e.g. talking therapies) that would therefore benefit future generations of students as well as the wider population.

Participants will be given £15 worth of Amazon vouchers to say thank you for taking part. Participants will also be offered the chance to win a £50 Amazon voucher.

If you are a University of Manchester Psychology student you may, alternatively, receive eight research credits for taking part.

What will happen if I want to stop taking part?

You have the right to leave the study at any point, without needing to give any explanation. Should you wish to do this, simply tell the researcher (either by phone, email or face-to-face). If you choose to leave the study you will also have the option of having the data you supplied destroyed. However, once you have completed the study it will not be possible to ask for your data to be removed, as we will have no way of identifying which sets of answers are your own.

What if I am unhappy or there is a problem?
If you wish to complain or have any concerns about any aspect of the way you have been treated during this study, you can approach the study supervisor Dr Peter Taylor (0151 794 5530 or pjtay@liv.ac.uk). Alternatively, you can contact the Research Governance Officer (0151 794 8290 or ethics@liv.ac.uk). When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

Will my taking part in this research be confidential?
Yes it will. Upon completion of the study, or withdrawal from the study, all responses will be anonymised, which means that no one will know your identity or which responses are yours. Personal information which identifies you (for example, your contact details) will be stored separately to any other information you supply (e.g., completed questionnaires) and will be destroyed once you either complete or withdraw from the study.

The only exception to this is if you wish to hear about the results of the study. In this instance contact details will be stored securely in a locked filing cabinet, but it will not be possible to link these contact details to any other information you have supplied as part of the study.

Your responses will only be viewed by the researchers involved in the study. All information collected for this research project will be kept safely and securely on a University of Liverpool password-protected computer for 10 years in a central file store in line with University of Liverpool policy for the storage of research data. Anonymous hard copies of completed questionnaires and diaries will be stored in a locked filing cabinet on University grounds for no more than 10 years. Access to data by researchers not involved in the current study will be subject to further ethical review.

What will happen when the research ends?
Data will be analysed and the results will be written up. You will be contacted by the research team if you have told us that you would like to be kept informed of the results of the research.

Who can I contact for further information?

UNDERLYING PROCESSES IN SOCIAL ANXIETY

Suzanne Jakeman sjakeman@liverpool.ac.uk
Ray Manning rmanning@liverpool.ac.uk
Emma Weymouth: e.weymouth@liverpool.ac.uk

Thank you for taking the time to read this. You should keep this information sheet for future reference.

Appendix F: Consent form for empirical paper

CONSENT FORM

Title of Project: Psychological difficulties in the moment: The role of shame, social comparison and goal progress

Name of Researcher:

		Please initial the box
1	I confirm that I have read and understand the information sheet dated..... (version.....) for the above study. I have had the chance to think about the information, ask questions and have my questions answered.	
2	I understand that taking part is voluntary and that I can change my mind at any time without giving any reason, and without consequence.	
3	I give permission for the researchers to have access to my personal information, as detailed in the information sheet dated..... (version.....) including measuring my height and weight.	
4	I agree to take part in the above study.	
5	I would like to receive a summary of the findings at the end of study.	

Name of participant	Date	Signature
Name of person taking consent	Date	Signature

When completed: 1 for participant; 1 for researcher site file

Appendix G: Empirical paper intake assessment questionnaires

Baseline Interview Measures

Demographics

Age (Years):
Gender:
Ethnicity (PLEASE CIRCLE ONE):
White British
White other
Indian
Pakistani
Other Asian
Black African
Black Caribbean
Black other
Mixed
Other (please specify): _____

Beck Depression Inventory-II

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness

0 I do not feel sad.
1 I feel sad much of the time.
2 I am sad all the time.
3 I am so sad or unhappy that I can't stand it.

2. Pessimism

0 I am not discouraged about my future.
1 I feel more discouraged about my future than I used to be.
2 I do not expect things to work out for me.
3 I feel my future is hopeless and will only get worse.

3. Past Failure

0 I do not feel like a failure.
1 I have failed more than I should have.
2 As I look back, I see a lot of failures.
3 I feel I am a total failure as a person.

4. Loss of Pleasure

0 I get as much pleasure as I ever did from the things I enjoy.
1 I don't enjoy things as much as I used to.
2 I get very little pleasure from the things I used to enjoy.
3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

0 I don't feel particularly guilty.
1 I feel guilty over many things I have done or should have done.
2 I feel quite guilty most of the time.
3 I feel guilty all of the time.

6. Punishment Feelings

0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.

7. Self-Dislike

0 I feel the same about myself as ever.
1 I have lost confidence in myself.
2 I am disappointed in myself.
3 I dislike myself.

8. Self-Criticalness

0 I don't criticize or blame myself more than usual.
1 I am more critical of myself than I used to be.
2 I criticize myself for all of my faults.
3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.

10. Crying

0 I don't cry anymore than I used to.
1 I cry more than I used to.
2 I cry over every little thing.
3 I feel like crying, but I can't.

11. Agitation

0 I am no more restless or wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0 I have not lost interest in other people or activities.
1 I am less interested in other people or things than before.
2 I have lost most of my interest in other people or things.
3 It's hard to get interested in anything.

13. Indecisiveness

0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have much greater difficulty in making decisions than I used to.
3 I have trouble making any decisions.

14. Worthlessness

0 I do not feel I am worthless.
1 I don't consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compared to other people.
3 I feel utterly worthless.

15. Loss of Energy

0 I have as much energy as ever.
1 I have less energy than I used to have.
2 I don't have enough energy to do very much.
3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0 I have not experienced any change in my sleeping pattern.
1a I sleep somewhat more than usual.
1b I sleep somewhat less than usual.
2a I sleep a lot more than usual.
2b I sleep a lot less than usual.
3a I sleep most of the day.
3b I wake up 1–2 hours early and can't get back to sleep.

17. Irritability

0 I am no more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

18. Changes in Appetite

0 I have not experienced any change in my appetite.
1a My appetite is somewhat less than usual.
1b My appetite is somewhat greater than usual.
2a My appetite is much less than before.
2b My appetite is much greater than usual.
3a I have no appetite at all.
3b I crave food all the time.

19. Concentration Difficulty

0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual.
1 I get more tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

Appendix H: Empirical paper end of study assessment questionnaires

Experience of Shame Scale

Everybody at times can feel embarrassed, self-conscious or ashamed. These questions are about such feelings if they have occurred at any time in the past year. There are no 'right' or 'wrong' answers. Please indicate the response which applies to you with a tick

	Not at all	A little	Moderately	Very much
1. Have you felt ashamed of any of your personal habits?				
2. Have you worried about what other people think of any of your personal habits?				
3. Have you tried to cover up or conceal any of your personal habits?				
4. Have you felt ashamed of your manner with others?				
5. Have you worried about what other people think of your manner with others?				
6. Have you avoided people because of your manner?				
7. Have you felt ashamed of the sort of person you are?				
8. Have you worried about what other people think of the sort of person you are?				
9. Have you tried to conceal from others the sort of person you are?				
10. Have you felt ashamed of your ability to do things?				
11. Have you worried about what other people think of your ability to do things?				
12. Have you avoided people because of your inability to do things?				
13. Do you feel ashamed when you do something wrong?				
14. Have you worried about what other people think of you when you do something wrong?				
15. Have you tried to cover up or conceal things you felt ashamed of having done?				
16. Have you felt ashamed when you said something stupid?				
17. Have you worried about what other people think of you when you said something stupid?				
18. Have you avoided contact with anyone who knew you said something stupid?				
19. Have you felt ashamed when you failed in a competitive situation?				
20. Have you worried about what other people think of you when you failed in a competitive situation?				
21. Have you avoided people who have seen you fail?				
22. Have you felt ashamed of your body or any part of it?				
23. Have you worried about what other people think of your appearance?				
24. Have you avoided looking at yourself in the mirror?				
25. Have you wanted to hide or conceal your body or any part of it?				

SOCIAL COMPARISON SCALE

Please circle a number at a point which best describes the way in which you see yourself in **comparison to others**.

For example:

Short	1	2	3	4	5	6	7	8	9	10	Tall

If you put a mark at 3 this means you see yourself as shorter than others; if you put a mark at 5 (middle) about average; and a mark at 7 somewhat taller.

If you understand the above instructions please proceed. Circle one number on each line according to how you see yourself in relationship to others.

In relationship to others I feel:

Inferior	1	2	3	4	5	6	7	8	9	10	Superior
Incompetent	1	2	3	4	5	6	7	8	9	10	More competent
Unlikeable	1	2	3	4	5	6	7	8	9	10	More likeable
Left out	1	2	3	4	5	6	7	8	9	10	Accepted
Different	1	2	3	4	5	6	7	8	9	10	Same
Untalented	1	2	3	4	5	6	7	8	9	10	More talented
Weaker	1	2	3	4	5	6	7	8	9	10	Stronger
Unconfident	1	2	3	4	5	6	7	8	9	10	More confident
Undesirable	1	2	3	4	5	6	7	8	9	10	More desirable
Unattractive	1	2	3	4	5	6	7	8	9	10	More attractive
An outsider	1	2	3	4	5	6	7	8	9	10	An insider

Experience of Close Relationships Scale – Short form (ECR-S)

Instruction: The following statements concern how you feel in romantic relationships. We are interested in how you generally experience relationships, not just in what is happening in a current relationship. Respond to each statement by indicating how much you agree or disagree with it on the below scale, by circling the corresponding number.

	Strongly Disagree		**Disagree**		**Slightly Disagree**		**Neutral**		**Slightly Agree**		**Agree**		**Strongly Agree**
It helps to turn to my romantic partner in times of need.	1	-	2	-	3	-	4	-	5	-	6	-	7
I need a lot of reassurance that I am loved by my partner.	1	-	2	-	3	-	4	-	5	-	6	-	7
I want to get close to my partner, but I keep pulling back.	1	-	2	-	3	-	4	-	5	-	6	-	7
I find that my partner(s) don't want to get as close as I would like.	1	-	2	-	3	-	4	-	5	-	6	-	7
I turn to my partner for many things, including comfort and reassurance.	1	-	2	-	3	-	4	-	5	-	6	-	7
My desire to be very close sometimes scares people away.	1	-	2	-	3	-	4	-	5	-	6	-	7
I try to avoid getting too close to my partner.	1	-	2	-	3	-	4	-	5	-	6	-	7
I do not often worry about being abandoned.	1	-	2	-	3	-	4	-	5	-	6	-	7
I usually discuss my problems and concerns with my partner.	1	-	2	-	3	-	4	-	5	-	6	-	7
I get frustrated if romantic partners are not available when I need them.	1	-	2	-	3	-	4	-	5	-	6	-	7
I am nervous when partners get too close to me.	1	-	2	-	3	-	4	-	5	-	6	-	7
I worry that romantic partners won't care as much about me as I care about them.	1	-	2	-	3	-	4	-	5	-	6	-	7

Social Interaction Anxiety Scale

Name: _____ Date: _____

Instructions: For each item, please circle the number to indicate the degree to which you feel the statement is characteristic or true for you. The rating scale is as follows:

0 = **Not at all** characteristic or true of me
1 = **Slightly** characteristic or true of me
2 = **Moderately** characteristic or true of me
3 = **Very** characteristic or true of me
4 = **Extremely** characteristic or true of me

Characteristic	Not at all	Slightly	Moderately	Very	Extremely
1. I get nervous if I have to speak with someone in authority (teacher, boss, etc.).	0	1	2	3	4
2. I have difficulty making eye contact with others.	0	1	2	3	4
3. I become tense if I have to talk about myself or my feelings.	0	1	2	3	4
4. I find it difficult to mix comfortable with the people I work/study with.	0	1	2	3	4
5. I find it easy to make friends my own age.	0	1	2	3	4
6. I tense up if I meet an acquaintance in the street.	0	1	2	3	4
7. When mixing socially, I am uncomfortable.	0	1	2	3	4
8. I feel tense if I am alone with just one other person	0	1	2	3	4
9. I am at ease meeting people at parties, etc.	0	1	2	3	4
10. I have difficulty talking with other people.	0	1	2	3	4

Please turn over to complete the questionnaire

Characteristic	Not at all	Slightly	Moderately	Very	Extremely
11. I find it easy to think of things to talk about.	0	1	2	3	4
12. I worry about expressing myself in case I appear awkward.	0	1	2	3	4
13. I find it difficult to disagree with another's point of view.	0	1	2	3	4
14. I have difficulty talking to attractive persons of the opposite sex.	0	1	2	3	4
15. I find myself worrying that I won't know what to say in social situations.	0	1	2	3	4
16. I am nervous mixing with people I don't know well.	0	1	2	3	4
17. I feel I'll say something embarrassing when talking.	0	1	2	3	4
18. When mixing in a group, I find myself worrying I will be ignored.	0	1	2	3	4
19. I am tense mixing in a group.	0	1	2	3	4
20. I am unsure whether to greet someone I know only slightly.	0	1	2	3	4

Social Phobia Scale

Name: _____ Date: _____

Instructions: For each item, please circle the number to indicate the degree to which you feel the statement is characteristic or true for you. The rating scale is as follows:

0 = **Not at all** characteristic or true of me
1 = **Slightly** characteristic or true of me
2 = **Moderately** characteristic or true of me
3 = **Very** characteristic or true of me
4 = **Extremely** characteristic or true of me

Characteristic	Not at all	Slightly	Moderately	Very	Extremely
1. I become anxious if I have to write in front of other people.	0	1	2	3	4
2. I become self-conscious when using public toilets.	0	1	2	3	4
3. I can suddenly become aware of my own voice & of others listening to me.	0	1	2	3	4
4. I get nervous that people are staring at me as I walk down the street.	0	1	2	3	4
5. I fear I may blush when I am with others.	0	1	2	3	4
6. I feel self-conscious if I have to enter a room where others are already seated.	0	1	2	3	4
7. I worry about shaking or trembling when I'm watched by other people.	0	1	2	3	4
8. I would get tense if I have to sit facing people on a bus or a train.	0	1	2	3	4
9. I get panicky that others might see me faint, or get sick or ill.	0	1	2	3	4
10. I would find it difficult to drink something if in a group of people.	0	1	2	3	4

Please turn over to complete the questionnaire

Characteristic	Not at all	Slightly	Moderately	Very	Extremely
11. It would make me feel self-conscious to eat in front of a stranger at a restaurant	0	1	2	3	4
12. I am worried people will think my behaviour odd.	0	1	2	3	4
13. I would get tense if I have to carry a tray across a crowded cafeteria.	0	1	2	3	4
14. I worry I'll lose control of myself in front of other people.	0	1	2	3	4
15. I worry I might do something to attract the attention of other people.	0	1	2	3	4
16. when in an elevator, I am tense if people look at me	0	1	2	3	4
17. I can feel conspicuous standing in a line	0	1	2	3	4
18. I can get tense when speaking in front of other people	0	1	2	3	4
19. I worry my head will shake or nod in front of others	0	1	2	3	4
20. I feel awkward and tense if I know people are watching me	0	1	2	3	4

Appendix I: Experience Sampling Methodology study diary (momentary questionnaires abbreviated to one timepoint – actual booklet included six timepoints)

HOW TO USE THIS BOOKLET:

Fill in the booklet immediately after you hear the beep.

Don't think for too long about the questions, we're interested in your spontaneous responses

Circle one digit in every line

Don't forget to fill in the last page of the booklet before you go to sleep

IMPORTANT INFORMATION ABOUT MOBILE PHONE TEXT ALERTS:

Text alerts will be sent 6 times a day, between 10:00am and 10:00 pm. If you do not get these during the day for four hours, there may be something wrong with the text alert system. Please let us know!

Try to keep your phone and diary with you as much of the time as possible. It is however okay to turn your phone off if you need to (e.g., for a meeting or going to the cinema).

If you do miss a text alert or cannot complete your diary for some reason (e.g., in a meeting) you can still can still complete the diary up to 15 minutes after the text alert was sent. If the text alert you missed was sent longer than 15 minutes ago please ignore this and wait for the next alert before you complete the diary.

ANY PROBLEMS WITH THE STUDY?

Contact:

Participant number: _____

Today's date: _____

During the first meeting with the researcher you will have identified two personal goals that matter to you. Please record these below:

Goal 1:

Goal 2:

I did not fill in the booklet:
Date: ……..
From: ……..hrs ……min
To: ……...…hrs …….min
Reason: ……
……
……
……
Date: ……..
From: ……..hrs ……min
To: ……...…hrs …….min
Reason: ……
……
……

Date: ……..
From: ……..hrs ……min
To: ……...…hrs …….min
Reason: ……
……
……
……
Date: ……..
From: ……..hrs ……min
To: ……...…hrs …….min
Reason: ……
……
……

Please describe your mood just before you received the most recent prompt:

I feel...

	Not at all			Moderately			Very much
▪ Sad	1	2	3	4	5	6	7
▪ Overactive	1	2	3	4	5	6	7
▪ Miserable	1	2	3	4	5	6	7
▪ Happy	1	2	3	4	5	6	7
▪ Disgusted with self	1	2	3	4	5	6	7
▪ Tense	1	2	3	4	5	6	7
▪ Ashamed	1	2	3	4	5	6	7
▪ Elated	1	2	3	4	5	6	7
▪ Down	1	2	3	4	5	6	7
▪ Sped up inside	1	2	3	4	5	6	7
▪ Blameworthy	1	2	3	4	5	6	7
▪ Remorse	1	2	3	4	5	6	7
▪ Anxious	1	2	3	4	5	6	7
▪ Dissatisfied with myself	1	2	3	4	5	6	7
▪ Stressed	1	2	3	4	5	6	7
▪ Like a bad person	1	2	3	4	5	6	7
▪ Guilty	1	2	3	4	5	6	7
▪ Restless	1	2	3	4	5	6	7
▪ Calm	1	2	3	4	5	6	7
▪ I feel bad about something I have done	1	2	3	4	5	6	7

Right now, I feel:

	Not			Moderately			Very
That others dislike me	1	2	3	4	5	6	7
That others might hurt me	1	2	3	4	5	6	7
Safe	1	2	3	4	5	6	7
Suspicious	1	2	3	4	5	6	7

Since the last prompt:

	Not at all			Moderately			Extremely
I have felt in control of my eating	1	2	3	4	5	6	7
I have tried to control my eating	1	2	3	4	5	6	7

Where are you? .....
Are you with others? Yes / No
If so, who? Stranger(s) □ Acquaintance(s) □ Friend(s) □ Family □ Partner □

How do you feel you compare to others at the moment?

Inferior	-3	-2	-1	0	1	2	3	Superior
Less competent	-3	-2	-1	0	1	2	3	More Competent
Less talented	-3	-2	-1	0	1	2	3	More talented
Less attractive	-3	-2	-1	0	1	2	3	More attractive

Since the last prompt, the most important event that happened to me was: ……....
……
……

	Very Unpleasant			Moderate		Very Pleasant	
This was:	-3	-2	-1	0	1	2	3

The following items relate to the personal goals you listed during the initial interview (see front of booklet)

Goal 1:
How much goal progress do you feel you are making?

No progress	1	2	3	4	5	6	7	A great deal of progress

How much effort do you feel you are making to achieve this goal?

No effort	1	2	3	4	5	6	7	A great deal of effort

Goal 2:
How much goal progress do you feel you are making?

No progress	1	2	3	4	5	6	7	A great deal of progress

How much effort do you feel you are making to achieve this goal?

No effort	1	2	3	4	5	6	7	A great deal of effort

PLEASE FILL THIS IN (ESSENTIAL): It is now exactly: ……..... Hours ……..... min

Appendix J: Signposting sheet to mental health services

D.Clin.Psychol. Research
Department of Psychology
Whelan Building
Brownlow Hill
University of Liverpool
L69 3GB

Dear Participant,

Thank you for taking the time to contribute to our research over the last week. Your contribution is greatly appreciated.

As you have been informed, part of this study looked at eating disorder symptoms in students. Although we cannot offer a diagnosis, some of the following symptoms are often associated with eating disorders (which include anorexia nervosa, bulimia nervosa and binge-eating disorder):

- Preoccupation with thoughts of food, eating or weight.
- Distorted body image.
- Significant weight-loss or weight-gain (although this is not necessary).
- Food restriction.
- Binge-eating and behaviours used to prevent weight gain (e.g. self-induced vomiting, excessive exercise and laxative misuse).
- Feeling 'out of control' when eating.

If you experience any of these symptoms and are concerned about your eating, it is advised that you consider talking to your GP. Please be aware that a number of behaviours that a person might engage in when they are trying to control their weight can have consequences for their health. Specifically, excessive dieting or exercise, self-induced vomiting or misuse of medication such as laxatives can all have serious health consequences, for example depleting your body of vital nutrients and electrolytes. If you are engaging in these behaviours as a result of concerns about your appearance or weight, it may be helpful to discuss this with your GP.

If you have experienced any distress in relation to your eating (or any other concerns) as a result of participating in this study, again, please consider talking to your GP.

Alternatively, please contact one of the research team, and we will be happy to help you find alternative sources of support (email addresses at the top of this document). We have also provided a list of other possible sources of support on the reverse of this sheet, that you may also want to consider.

Sources of support and help

Difficulties with distressing feelings like anxiety and depression are common in the UK but can have a huge impact upon a person's life. If you have been struggling with these experiences, either in the past, or since taking part in this study, there are a number of sources of support available to you.

- It may be helpful to talk to your GP about these feelings
- There are a number of helplines dedicated to providing support to those struggling with depression, anxiety and other difficult emotions:
    - **Samaritans** (08457 90 90 90; open 24 hours).
    - **Saneline** (0845 767 8000; 6pm-11pm daily)
    - **B:EAT** – eating disorder helpline (Youthline [25 years old and under]: 0845 634 7650 Monday - Friday 1.30pm-4.30pm; Adult helpline [18 years old and over]: 0845 634 1414 Monday – Friday 1.30pm-4.30pm; www.b-eat.co.uk).
    - **Anxiety UK** (08444 775 774, Monday – Friday 9.30am – 5.30pm, www.anxietyuk.org.uk/)
- Your University also has a Counselling service which can help
    - **University of Manchester Counselling service** (0161 275 2864, www.studentnet.manchester.ac.uk/counselling, counselling.service@manchester.ac.uk)
    - **University of Liverpool Counselling service (**0151 794 3304, http://www.liv.ac.uk/studentsupport/counselling, counserv@liverpool.ac.uk**)**
- Your are also welcome to contact the study researchers, who will be able to suggest possible sources of support

- Suzanne Jakeman sjakeman@liverpool.ac.uk
- Ray Manning rmanning@liverpool.ac.uk
- Emma Weymouth e.weymouth@liverpool.ac.uk

Many thanks again for your participation in our research. Should you have any further queries, please do not hesitate to contact one of the research team.